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# Electricity for the Home.

THE view has repeatedly been expressed in these columns that the potentialities of electrical development are greater in the home than in any other sphere. A recent estimate has been made of 1,500 kWh per head per annum as an average for this one class of consumer, with electrification carried out to the fullest extent. There are indications on every hand that there is a very lively interest in the subject.

It seems to be agreed that progress depends upon a trinity: *viz.*, suitable tariffs, hire or hire-purchase of installations and apparatus over reasonable periods, and adequate arrangements for maintenance and instruction in use.

Tariffs are of even more importance in the sale of electricity than in the case of most other commodities. While the quantity consumed of some articles, *e.g.*, bread, alters only slightly with selling price, the demand for electricity is highly elastic, and therefore sensitive to price variation, due partly to the competition of other agents and also to the higher standard of living to which it gradually accustoms the user. By price variation in this case is meant the secondary or running charge of a two-part tariff, which is directly affected by increased consumption, and it is therefore important that this portion of the charge should be low enough to encourage the liberal use of electricity. The average price depends upon a number of factors and is usually of little value as a criterion.

Fortunately commercial expediency is in this case founded upon a sound financial basis, since a relatively small proportion of the cost of electricity supply (corresponding generally within close limits to the cost of coal at prevailing load factors) forms the running charge. A most satisfactory feature of the present position is that British designers are quite ready to meet the needs of consumers with efficient and reliable apparatus. The question remains as to how far supply authorities are supporting the manufacturers in the manner referred to above. In answer it may be said that the more progressive undertakings foresaw the possibilities of this load many years ago and were, in fact, ahead of many other countries, notably the U.S.A., with regard to heating and cooking. At present their prices compare very favourably (for the consumer) with those

charged in the U.S.A., while in service methods they are very little, if any way, behind. Good, however, is not necessarily good enough if the full possibilities of the domestic load are to be realised.

There is considerable diversity in sales practice among our supply authorities. We think this is all to the good in the early stages of a movement, since a later standardisation can prove efficient only through a selection of the best that this creative diversity has produced.

It is with a view to assisting the process by which the best from each undertaking may gradually become welded into a synthetic standard of performance that we have in this issue, under the heading "Electricity for the Home" (p. 519), enlarged the section we have hitherto devoted to introducing to the notice of our readers new domestic electrical apparatus, of which we are always pleased to receive early information. This section will also provide accounts of what is actually being done by different undertakings in promoting the use of electricity in the home. Editorial comment will be made from time to time in our leading columns on points of outstanding importance. Thus in this week's article it will be seen that the progress made in recent months by the electricity undertakings of the Metropolitan Boroughs of Fulham and Hammersmith, is an excellent example of achievements resulting from the above-mentioned trinity.

We believe that the practical experiences recorded in this section will be of interest, not only to supply authorities, but also to manufacturers and contractors; since whatever the skill employed in the design of electrical apparatus and whatever the quality of its workmanship, it is the test of everyday experience in the homes of the people that will show what really are practical, popular, and therefore desirable features in its construction.

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**Do Mergers Mean Cheap Electricity?**

DURING the last few years there has been a strong movement towards the co-ordination of electricity supply in this country. Governments have taken the matter in hand, with the result that the Central Electricity Board has been formed to deal with the matter on a national scale. At the same time private interests have been coming together to form large groups of supply companies.

In the case of the Government scheme the motive has been principally a technical one—to improve the efficiency of the whole system by co-ordinating effort and eliminating the inefficient. The financing of the scheme is expected to come from the savings which will be effected, and, in addition, certain benefits (variously estimated) are to fall upon the consumer.

The companies' arrangements, although ostensibly aimed at improving the methods of supply, are very largely financial. If, however, they have the result of lowering the price of electricity to the consumer nobody will be displeased, except possibly the gas interests. Many people (particularly local authorities) are questioning the possibility of cheaper energy when the companies' undertakings are paid for at rates which appear to be excessive, having regard to their assets, or even to their prospects, excellent though they may be. These people maintain that if the merger or holding companies are to satisfy their shareholders the prospects of reduced charges are very remote. It is conceivable, however, that these companies may be able to bring about such improvements as will confer benefits on both parties.

In this connection a warning has been sounded by Mr. Matthew S. Sloan, one of the leaders of the United States electricity supply industry. As reported in our "Business Notes," Mr. Sloan says that merger companies must not only reduce their expenses, improve their service, and increase their sales, but must also share with the consumer any increased profits made in this way if they are not to be regarded as a public menace. Moreover, he claims that the continued fall in the price of electricity has proved that this has been done by the United States companies.

Let us hope that this advice will be followed in this country, even if it means an entire change of policy in some of the companies concerned, whose efforts to supply electricity cheaply have not been very strenuous in the past.

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**The Acquirement of Technical Knowledge.**

ONE hears less from the young engineer nowadays of the supposed contradiction between theory and practice. This is to the good, since much of his professional success will depend upon a proper realisation of the facts that a sound knowledge of fundamental principles is an essential instrument with which to carve out a career, and that skill to use the instrument can only be acquired by experience and by deliberately cultivating a practical turn of mind. Thus, while the fruits of the work of his predecessors will be at his disposal, he need not lose his individuality in the printed word, but can so develop his character that he can add his own original contribution to the common stock.

In this week's issue appears an article on the choice of technical books which will probably be of considerable assistance to students in enabling them to form a suitable library. The author does not profess to deal with all the many excellent books covering the range of subjects requisite, and our readers will no doubt have other preferences in many cases. The lack, until quite recently, of good works on the economics of engineering is commented upon, and this brings us close to the practical touchstone of the manner in which the knowledge gained by study is to be applied.

The advice was once given to us—advice which the passing of years has shown to be well founded—that, concurrently with mental application to text books, should go a regular perusal of the more important and more widely ranging technical papers. It was suggested that these not only gave the student an idea of how men of affairs were actually applying their knowledge in important matters, but also kept his intelligence alert and healthily controversial.

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**World Electrical Trade.**

THE German review of the pre-war and post-war electrical trade of the world's leading producers which appears in this issue is interesting if not encouraging so far as Great Britain is concerned. The trade has grown very considerably. The 1928 value was two and a half times that of the 1913 exports. In this respect Great Britain has kept pace, for its exports rose by 140 per cent. in the same period. In 1928, however, our percentage share of the total trade was smaller than in 1913.

The United States has made a considerable advance; in the period 1913-1928 the value of its electrical exports quadrupled, and at the end of the period it had risen to second place. Germany is showing a remarkable recovery. Although in 1925 German exports were only slightly higher than in 1913, between that year and 1928 they showed an advance of 46 per cent., while Great Britain and America recorded increases of 6 per cent. and 27 per cent., respectively.

The development of some of the smaller suppliers of the world market is notable although their shares are relatively very small. Only France and Italy failed to increase their proportions. This improvement has, of course, had an effect upon the three largest suppliers. Whereas before the war they together provided for 84 per cent. of the world's requirements, in 1928 their share had fallen to 73 per cent.

The brief analysis of markets is interesting. It is shown that South America and Great Britain are Germany's most important customers. About 60 per cent. of the American electrical exports are sent to the north and south of that continent, while Great Britain relies to a very large extent upon the Dominions and Colonies.

According to the German figures, which must be largely conjectural in this respect, the United States production in 1928 was nearly seven times the British production and over 2½ times that of Germany.

# Decorative Illumination.

**An account of the art of decorative illumination since 1915, with particular reference to the International Exhibition at Barcelona, 1929.**

By BEATRICE IRWIN, A.A.

BETWEEN 1915 and 1929 there has been time for progress, and good use has been made of that time, for if we compare the Panama Pacific International Exposition of San Francisco (1915) with the present International Exhibition at Barcelona (1929), we can honestly congratulate both engineers and the public upon a marked development in skill and taste, and in appreciation of the beauty and possibilities of light, as a factor in human enjoyment. This appreciation has been largely due to various exhibitions and to the serious endeavours of a group of progressive engineers, who are creating an art as well as a science of illumination.

The use of colour has been the basis of this art, and was probably the cause of its inception. At least, the first serious claim for decorative illumination on a big scale was made at the Panama Pacific Exposition in San-Francisco, where the coloured flood-lighting of buildings and fountains marked a new era in illuminating engineering. Through these efforts various important departures and discoveries were made, among them the fact that light, instead of merely outlining buildings by the white spot-light system hitherto chiefly used, could, by means of coloured floods, give depth and added richness to architecture and create landscape vistas of unusual beauty.

It was also observed that coloured light, combined with fountains, could rival music as an item in popular entertainment.

It is true that this idea had been already exploited at Versailles and at other exhibitions, but not quite in the same way; the former methods having been developed by projecting colours on to the surface of playing waters, the new system being the incorporation of coloured light in the body of, and in combination with, the architecture of the fountain itself, which greatly amplifies results.

Co-existent with San Francisco there was the beautiful exposition in the sister city of San Diego, which also contributed its share to this crusade for beauty in illumination. Possibly as a result of these exhibitions, in 1919 at the Annual Congress of the Illuminating Engineering Society of America, in New York, an entire evening was devoted to a "Colour Symposium" at which the subject of colour in illumination was discussed by various experts. The papers read at this debate gave colour its first official recognition as a scientific and artistic essential in illumination. In 1922 the Wembley Exhibition near London carried on the lighted torch with credit, and in 1923 the Exposition des Arts Decoratifs in Paris contributed some graceful novelties to illumination in the shape of floating restaurants and fountains which were anchored in the Seine. With the exception, however, of certain choice and unexpected corners of landscaping, the general illumination of this exhibition fell far below the standards of San-Francisco San Diego, or Wembley.

Fig. 1.—Avenue Maria, Christina.

In 1928 an international exhibition at Long Beach, California, again marked progress by the specialisation of two important principles in coloured illumination, *i.e.*, filtration and reflection. A novel system of colour filter illumination was used in the Palace of Fine and Applied Arts, by means of which specialised scientifically proportioned colour values were diffused over certain groups of paintings, sculpture—Batiks, tapestries, &c.—thereby enhancing the value of each group of

works, besides providing a pleasantly varied quality of light, very restful to the eyes of the tired sight-seer.

These colour filters consisted of hand-painted parchment devices which in themselves constituted fixtures, replacing metal and glass by exquisite colour combinations allied to graceful forms.

The value of static colour, or colour in reflection, was brilliantly conceived and engineered by building

**Fig. 2.—Details of Obelisk Lighting.**

the principal square of the exhibition around a lake, in the centre of which was a band-stand, and around which were grouped illumined towers and pavilions that reflected themselves into the still shadow of the water. This lake was christened the Pool of Reflections, and, through its services, the dramatic relations of light to shadow were variously revealed and much appreciated by the public.

In this exhibition, a third departure was also made that marked progress in taste: in the lighting of the towers more delicate colour-combinations were used, nile green, coral pink, orchid, moon-blue and primrose yellow being employed instead of the customary crimsons, dark greens, and blatant yellows generally considered essential in spectacular effects.

As each of these exhibitions has marked development in the art of illuminating engineering, and as it was the writer's privilege to take part in all of them, a review of their achievements has seemed an appropriate introduction to the record of operations at Barcelona, for to the past we owe the present, and in the present we forecast the future.

Beautiful as this international exhibition is—with its Spanish, oriental, classic, and modernistic palaces scattered among the terraced groves of Montjuich Park—its outstanding attraction and achievement lies in its decorative exterior illumination and in its illumined fountains and cascades, which at night create a world of opalescent flame and musical movement. We lose ourselves gladly in these gardens of light that surpass all limitations of the written word.

Perhaps the development of such gardens of light may become a recognised factor in city planning, and refresh the lives of city dwellers as much as national parks have done in the past. The decorative illuminations at Barcelona at least suggest this thought as a feasible and wonderful possibility, appropriate to our electric age. Meanwhile let us consider some of the technical details that have gone to the creation of this poem of engineering skill, in which several countries have co-operated, but for whose dream and creative execution we have to thank the genius of Carlos Buigas Sans—a native son of Barcelona. Mr. Juan de Lasarte Karr was responsible for all the interior illumination and for the general direction of the power plant.

I am indebted to the courteous co-operation of Mr. Buigas Sans and Mr. de Lasarte Karr for the technical details which are contained in the tabulation annexed, which furnish an engineering key to the plan of operations.

### Decorative Exterior Illumination at Barcelona International Exhibition, 1929.

Avenue Maria Christina.

*Obelisks.*—116 18 ft. high with lamps for 4 colour changes. 8,000 W per obelisk. Total = 948 kW.

*The "Grand Fountain."*—

Power—182 motors = 1,511 h.p.
Water = 2,610 litres per sec.
Light = 1,215 kW.

*Four Cascades.*—(Total operations).

Power—16 motors = 1,822 h.p.
Water = 9,924 litres per sec.
Light = 281 kW.

Total illumination of fountains and cascades = 2,316 kW.

General decorative illumination of exhibition grounds = 5,222 kW.

The total electrical demand of the exhibition exceeds 20,000 kW, distributed among 42 transformation stations.

Electrical energy is received at 50,000 V and is transformed to 6,000 V.

Two big electrical companies furnish the current, and the reserves of either can meet all the needs of the exhibition, which is, by this arrangement, safeguarded against failure of supply.

Total cost of electrical and mechanical installations, including motors, about 15,000,000 pesetas (£527,000).

The fact that various countries have contributed to this achievement renders it an international as well as a national triumph, and Barcelona generously acknowledges the resources of the engineering firms in America, England, France, Holland, Germany, and Czecho-Slovakia, to whose specialised machinery and skill she has had access.

**Fig. 3.—Obelisk Lighting in the Court of the Universe.**

France, Germany, America, and Holland have joined hands in much of the structural work of the "Grand Fountain." England has furnished most of the mechanism of the cascades; America most of the reflector and search-light systems, which make the palaces bright beacons far into the night. Holland has also been tributary to this service.

Czecho-Slovakia has furnished all the coloured glass

which bring the mobile glories of the spectrum into the field of action. This multi-coloured magic is abundantly tempered by the coolness of translucent white, and jade green glasses, which are the special product of Barcelona. One must also add that 90 per cent. of the actual assembling and construction was done in Spain and that, exclusive of masonry, cement foundations, &c., the complete decorative illumination was installed in the incredibly short time of three months, though it took about twelve months for Señor Buigas Sans to create and have his designs prepared. The scope of these plans is best conveyed by the accompanying table of figures, but their enchantment eludes description. Before losing ourselves, however, in this wonder-land of crystal and flame, let us make a short survey of the palaces, where for the most part we find a conventional but highly efficient and comfortable distribution of light, effected by means of hanging bowls of an opaque but thin white glass of German make.

In the Grand National Palace and the Palace of Modern Art, both dedicated to painting, sculpture and decorative arts, one could have wished to see a little more specialisation, both in lighting values and fixture development, though the vast area to be covered probably made this prohibitive.

**Fig. 4.—Cascades in front of the Grand National Palace.**

In the Sala de Proyecciones, or combination theatre and concert hall, with a seating capacity of 2,000, a vital, cool, and airy atmosphere is achieved by means of cove-lighting, a luminous glass ceiling in the main entrance and in the body of the hall, and close to the stage, flat pylons of translucent white glass about 20 ft high, which diffuse brilliance over a large area. As the writer has employed the pylon mode of illumination in several modern buildings in California and has faith in its use as superior to ceiling fixtures, it was a pleasant endorsement to find it serving so efficiently in this beautiful hall, though a delicate amber or green tinge would have added considerably to the charm of the installation, such a large area of white glass being rather dead in effect against the grey stone walls, and fatiguing to the eyes.

In the decorative illumination of this exhibition at Barcelona, we find the subtle beauties of colour, light, and water combined in new ways, with the minimum development of setting, and the maximum development of their own intrinsic values, the whole being harmonised into a symphonic mass of arresting power. Flanked on each side by the classic Palaces of Industry and Agriculture, the Avenue Maria Christina, fig. 1, which is the main entrance, presents a luminous vista of 116 crystal obelisks each 18 ft. high, figs. 2 and 3, built in pale yellow and white glass, sufficiently opaque to conceal all the mechanism which produces melting changes of colour in them every five minutes. This orchestration of subtle variations sweeps up the whole half mile length of terraced stairways, fountains and cascades, which lead by luminous progressions to the Grand National Palace, fig. 4. This imposing architectural climax crowns the summit of the hill, radiating its aurora of piercing blue search-lights almost to the stars. Behind each obelisk, small non-luminous fountains play, creating a refreshing fringe of coolness for the eyes. Our first halt is at the "Grand Fountain," which leaps up 165 ft. from a three-tiered circular basin, in which 40 satellite fountains play.

The base of each fountain is framed by circles of greenish-white, petal-shaped glass, the whole effect being that of translucent water lilies with mammoth pistils of liquid flame. The music of this mass of leaping waters refreshes us for the next ascent, and our attention is arrested by four massive steaming urns of light, which give an impression of votive incense. These urns surmount a balustrade which marks the boundary line of a progression of four cascades, ever increasing in height and volume.

In the pool formed by each of these cascades three fountains play, and supporting this volume of transparent opalescence are two stairways with 12 very deep steps, each 3 ft. high, slightly hollowed, and containing small pulverised fountains that add an exquisite note of mystery to this orchestration of light. The bars of this score are formed by the rhythmic shadows of tall cypress trees, and culminate in two 10 ft. translucent cones of changing lights.

As we pause to take breath at the head of these stairs, we find ourselves on a delicately wooded elevation, and facing the last, the "Grand Cascade" (36 ft. × 72 ft.), which is a miniature Niagara, and creates a storm of wavelets in its own pool.

As we gaze into this wall of crystal light through which the spectrum slowly surges, we seem to glimpse a world of djinns and sylphs at play, and we feel that after all, the wonders of modern science and the pagan world are not so far apart, for here the hidden forces of nature and man salute each other with a primeval kinship! One more short flight of stairs, and we reach the Grand National Palace. Here we lean on the balustrade in company with life-size statues of the ancient gods, gazing down with them upon the length, breadth, depth, height, and the whole glorious achievement of beauty, and we are silently thankful that our "Metal Age" has still a soul!

There are many other courts and fountains of enchantment, scattered unexpectedly throughout the exhibition grounds, many flower-like combinations of glass and light that merit description, and that insistently force upon us the happy suggestion that gardens of light should be a novel and refreshing field of development in the near future. Gardens and parks have long been considered essential to communal well-being. Now, in our great electric age, why should we not have gardens of light?

The table of mechanical and economic values that this Exposition furnishes bears witness to the skill and research, and to the co-operative resources of wealth and service that modern life is spending and expending on progress and public welfare. There need be no limit to our outlook, for we are marching towards a new democracy greater than that of Greece or Rome, and the engineers of all lands are contributing their share to the building of the new day!

The Barcelona International Exposition was opened on May 15th, 1929. The general layout on a hillside lends itself extremely well to the display of illumination, planned to surpass anything previously attempted.

# The Choice of Technical Books.

## Notes on Tehnical Books Suitable for Students in Electrical Engineering.

By W. SIMPSON.

THE increasing severity of examinations, the high cost of books, and the modest resources of most students render it more than ever necessary that only the most suitable books for any given purpose should be purchased. The following somewhat sketchy notes are therefore offered by an engineering teacher in the hope that they may be of some service to private students.

As mathematics is usually regarded as the beginning of technical wisdom, we will consider this subject first. For those who have reached approximately school certificate standard in arithmetic, geometry, and algebra, nothing could be more useful than Volume I of "Mathematics for Engineers," by Rose (Chapman and Hall, 10s. 6d.). Some parts of this can obviously be lightly passed over, as they are of more importance to surveyors than to most engineers. If the student wishes to acquire a good working knowledge of the calculus, he should then make a close study of the second (and concluding) volume of the same work (price 13s. 6d.), which is mainly devoted to that awe-inspiring subject. There is much difference of opinion nowadays on the question whether calculus is really "worth while" to the average engineer, and we must admit that many have attained eminence without it. But there can be no doubt of its great utility (even as exercise in concentration!) and it is, of course, indispensable for advanced a.c. and wireless work, and for university degrees. Moreover, the practical kind of calculus used in engineering can hardly be compared in difficulty with the brain-turning abstractions required for degrees in pure mathematics.

Two other books on calculus are so valuable that no engineer should be without them. "Applied Calculus," by Bisacre (Blackie, 7s. 6d.), is intensely interesting and suggestive, and a gift at its price. "Calculus for Engineers," by Prof. Perry (Edward Arnold, 10s. 6d.) is a splendid work, which frankly regards the subject as a tool and demands little preliminary knowledge of algebra. In this book the famous Professor has indeed immortalised much of the teaching methods which his Finsbury pupils have so abundantly justified.

Those who are too weak in school work for the books above mentioned will do well to read "Commonsense of the Calculus," by Brewster (Oxford Press, 2s.) and "Calculus made Easy" (Macmillan, 3s. 6d.). The first is written for schoolboys, but forms an admirable introduction for boys of any age. The second is one of the best legacies of Professor S. P. Thompson.

"Exponentials made Easy," by Gheury de Bray (Macmillan, 4s. 6d.), was written as a companion to "Calculus made Easy," and is worthy of a place beside it.

Differential equations, now so prominent in electrical work, receive some attention in the works of Rose, Bisacre, and Perry above mentioned, but a much more detailed and very excellent treatment will be found in "An Elementary Treatise on Differential Equations and their Applications," by Professor Piaggio (G. Bell and Sons, 12s.). Only an elementary knowledge of calculus is assumed, and the examples, worked and unworked (with answers), are particularly valuable.

Turning now to physics, including mechanics, the most generally useful work is probably Duncan and Starling's "Text Book of Physics," published by Macmillan (18s. complete, or in separate parts), *viz.*, dynamics; heat, light, and sound; and electricity and magnetism. It meets the requirements of the I.E.E. entrance examination (Part One) in these subjects, if supplemented by a little extra work in strength of materials, and covers most of the ground of the intermediate examinations of London University. Strength of materials is very ably treated in a book of that name by Dr. Warnock (Pitman, 12s. 6d.), but I.E.E. candidates do not require a complete mastery of this work. For those who choose chemistry at the I.E.E. examination, Dr. Bailey's "First Course in Inorganic Chemistry" (3s. 6d.) and "Second Stage Inorganic Chemistry" (6s.) can be strongly recommended. They are both published by the University Tutorial Press.

As regards examinations in the theory of electrical machines and apparatus, it is evident that there is a general tendency to relegate direct-current work somewhat to the background. This is quite natural in view of present conditions, and some recent examination papers, like this year's City and Guilds final, should warn candidates against spending too much time on multiple and multiplex dynamo windings when they are still hazy on transformer regulation! For most students, except prospective designers and advanced testers, the first eleven chapters of Cotton's "Electrical Technology" (Pitman, 12s. 6d.) will give a quite sufficient knowledge of d.c. machine theory, and supply engineers will find Maccall's "Continuous Current Electrical Engineering" (University Tutorial Press, 15s.) the best supplement to this for their remaining d.c. work.

Many writers on alternating currents, unfortunately, have attempted to rear an elaborate superstructure of machine and transformer theory on very inadequate foundations. If every serious student would make Dover's "Theory and Practice of Alternating Currents" his corner stone in this branch, he would be many times repaid when he proceeded to more "practical" work. A prospectus of this book, which costs 18s., may be obtained from Pitman's. Maccall's "Alternating Current Electrical Engineering" (University Tutorial Press, 15s.) gives an unusually lucid treatment of alternating current motors, and covers the a.c. portion of the City and Guilds final "general paper." For advanced a.c. and d.c. machine theory, the masterly works of Miles-Walker and C. C. Hawkins are too well known to need mention.

Engineering economics is a very unfairly neglected subject and one of the few that until recently lacked well-written literature. The latter reproach is now removed by the appearance of T. H. Burnham's "Engineering Economics" (Pitman, 12s. 6d.), which fully covers this portion of the A.M.I.Mech.E. examination in a most interesting manner. To supply engineers D. J. Bolton's "Electrical Engineering Economics" (Chapman & Hall, 21s.) is really indispensable.

Finally, we come to the study of foreign languages. German is usually admitted to be the most important in the electrical world, but French is infinitely more popular, partly because it is the only language studied by most boys at school and partly because it is considered so much easier to learn. German certainly is far more difficult to write with accuracy, let alone with elegance, but it is often forgotten that a good reading knowledge of this or any other European language can be gained in a quarter the time required for free composition therein. Assuming no previous knowledge of German, a good beginning may be made with Moffat's "Science German Course" (University Tutorial Press, 5s.). After this, as German technical papers may still seem rather forbidding, send to Messrs. B. H. Blackwell, Oxford, for a catalogue of the "Sammlung Goschen." This is a wonderful series of books on all branches of science and technology, simply but accurately written, at 1s. 6d. each. After reading a few of these on subjects with which you are already more or less familiar, you will soon be able to revel in the "Elektrotechnische Zeitschrift" and see over the heads

of your less enterprising fellows. The writer does not know of any corresponding series in French, but in this language they are not so much required, as a perusal of Moffat's "Science French Course" (University Tutorial Press, 5s.) will suffice to turn one's school knowledge into the right paths.

Italian presents few difficulties to anyone who has reached a fair standard in French, especially if he begins with Hugo's "Italian Grammar Simplified," which is obtainable from railway bookstalls at 3s. Although for commercial purposes it is of far less value than Spanish, Italian is of great and increasing value to students of electro-technics. But never try to learn Italian and Spanish concurrently, or you will suffer so much from brain fag that you will make little progress in either!

# The World's Electrical Exports.

## A German View of the Situation.

FOR the first time since the less informative report was placed before the Economic Conference at Geneva a few years ago, the Central Union of the German Electrical Industry (Centralverband der Deutschen Elektrotechnischen Industrie) has undertaken a compilation and comparison of the figures available for the whole world. These mainly concern the export and import trade of the countries concerned; the figures relating to production are still inadequate. The first part of the report deals with the development of the entire world exports of electrical products, showing that between 1913 and 1928 inclusive there was an augmentation in value of about 150 per cent., a far greater advance than in world exports generally, which is a sign of the constant advance in the use of electricity. The following table is given of the world exports of electrical products in 1913, 1925, and 1928, the figures being shown in millions of German marks, together with the percentage share in the exports held by each country in the years in question:—

THE WORLD'S ELECTRICAL EXPORTS.

| | Millions of German marks. | | | Percentage of the aggregate exports. | | |
|---|---|---|---|---|---|---|
| | 1913 | 1925 | 1928 | 1913 | 1925 | 1928 |
| Germany ... ... | 330 | 366 | 536 | 46.4 | 25.8 | 28.8 |
| United States ... | 112 | 354 | 448 | 15.7 | 25.1 | 24.0 |
| Great Britain ... | 157 | 356 | 377 | 22.0 | 25.2 | 20.2 |
| Holland ... ... | 12 | 54 | 105 | 1.7 | 3.8 | 5.6 |
| Sweden ... ... | 14 | 40 | 81 | 2.0 | 2.8 | 4.4 |
| France ... ... | 30 | 78 | 69 | 4.2 | 5.5 | 3.7 |
| Austria, Hungary, and Czecho-Slovakia ... .. | 10 | 54 | 67 | 1.5 | 3.6 | 3.6 |
| Switzerland ... | 24 | 47 | 66 | 3.5 | 3.4 | 3.6 |
| Belgium ... ... | 10 | 18 | 38 | 1.4 | 1.3 | 2.1 |
| Canada ... ... | — | 15 | 20 | — | 0.9 | 1.1 |
| Denmark ... ... | 2 | 12 | 19 | 0.2 | 0.9 | 1.0 |
| Japan ... ... | 2 | 11 | 19 | 0.2 | 0.8 | 1.0 |
| Italy ... ... ... | 8 | 12 | 16 | 1.2 | 0.9 | 0.9 |
| Total ... | 713 | 1,419 | 1,864 | 100.0 | 100.0 | 100.0 |

It will be seen that Germany increased its exports from 330 million marks in 1913 to 366 millions in 1925, and further to 536 millions in 1928, the latter representing an advance of only about 70 per cent. over 1913. On the other hand, the exports from the United States during the same period rose from 112 to 448 million marks or about fourfold, while the exports from Great Britain (157 millions in 1913 and 377 millions in 1928) more than doubled, and those from Holland were eight times larger. The percentage share of most of the other countries mentioned in the table made good progress, although the absolute figures which come into consideration are not of very great importance.

The main characteristic of the situation is that Germany, which accounted for 46.4 per cent. of the aggregate world exports in 1913, declined to a percentage of 25.8 in 1925. Since then the volume of the world exports has increased by about 440 million marks, of which about one half has devolved on Germany, so that the German share in the world exports in 1928 rose to 28.8 per cent. The Central Union does not consider that Germany will be able to regain its pre-war position, and it will be regarded as a success if the present German share can be maintained.

The report proceeds to show that out of the total value of the German exports in 1925 amounting to 366 million marks, 273 millions represented deliveries in Europe; the corresponding figures for 1928 were 536 millions and 419 million marks respectively. Among the European markets the highest place is credited to Great Britain, which absorbed goods to the value of 51 million marks in 1913, 69 millions in 1925, and 87 millions in 1928. German "overseas" exports represented 90 million marks in 1913, 93 millions in 1925, and 116 millions in 1928, South America in each case being the largest purchaser. The growth in the German exports since 1925 has been mainly due to machines and apparatus, Europe having absorbed in 1928 78 per cent. of the total German exports, while the percentage share of overseas countries has declined since 1913. Deliveries on reparation account increased from 10 million marks in 1925 to 22 millions in 1928. On the other hand, the imports of electrical products into Germany rose from 22 million marks in 1925 to 49 millions in 1928, these imports being principally special products.

In the case of the United States, the report states that the manufacturers there dispose of about 60 per cent. of their exports in the American Continent; they dominate North and Central American markets almost completely and are growing in influence in South America. Besides the geographical proximity of these southern markets, financial penetration is said to play a large part, while at the same time the Americans grant longer credits than any European country.

The greatest support of the English industry is stated by the report to be found in the Dominions and Colonies which take about two-thirds of the total exports. For the rest the British exports are said to have made no progress since 1925, and from 1926 have even fallen as a percentage of the world total. At the same time imports into Great Britain have increased from 104 million marks in 1925 to 126 millions in 1928, or over one-third of the exports, the reason cited being declining competitive capacity owing to the lack of "rationalisation."

After referring to the development of the export trade of Holland, Sweden and Japan, the report comes to consider the question of the production of different countries. The value of the output of the United States is stated to have reached 7,000 million marks in 1927, as against 1,400 millions in 1914, and to have further increased in 1928. The production of Germany, which was estimated at 1,300 million marks in 1913, is computed at between 2,600 and 2,700 million marks in 1928. In the case of England the output is estimated at 1,093 million marks in 1924, the Swedish at 131 millions in 1927, the Dutch at 94 millions in 1927, the Russian at 308 millions in 1926-27, and the Japanese at 465 millions (year not stated).

# Notes on Single-phase Motors.

## A General Discussion of the Characteristic Features of the Available Types of Machine.

By G. WINDRED.

THE number of single-phase electricity supply systems available in this country is certainly large; but not, perhaps, so large as in the majority of other countries. The problem of utilising single-phase power efficiently is therefore a very real one, which has occupied the attention of engineers for many years, and is still without a complete solution. It is the object of the present article briefly to consider the various aspects of this problem, and to indicate the lines upon which development has proceeded.

It will first be necessary to consider the different forms which have been assumed by the single-phase motor during its period of existence. In approximate order of development they are respectively :—

(1) The split-phase induction type.
(2) The monocyclic induction type.
(3) The commutator type.

1. *The Single-phase Split-phase Induction Motor.*—In the ordinary split-phase motor, which is usually of the squirrel-cage type, the stator is provided with two windings, which are connected to the supply in such a manner as to give rise to a rotating stator field approaching to sine-wave form. In practice the field form differs very considerably from sine form on account of the interactions which are set up in the rotating rotor flux, which make it impossible to preserve the field form during the starting period. The effect of the rotating stator field is to render the motor self-starting, and when the rotor has attained sufficient speed the auxiliary or starting winding on the stator is disconnected from the line. The rotating stator field is now produced solely by the interaction of the main alternating stator flux and the quadrature flux induced in the rotor circuit by the action of the rotor conductors in cutting the lines of primary flux. It follows that this torque-producing auxiliary flux is proportional to the speed of the rotor, and that if this speed is reduced by the application of load the auxiliary field strength will decrease, with a resulting loss of torque. For this reason, the overload capacity of the split-phase machine is very low, as compared with the polyphase machine, in which the rotor flux is not relied upon for the production of a torque-producing flux.

There are many methods of connecting the starting and running windings of a split-phase motor to the supply. In the majority of cases for machines of medium and large outputs a choke coil and resistance are employed for starting purposes, the former being connected in series with the starting winding, and the latter in series with the running winding. This method is by no means general, as occasionally the order of connection of the choke and resistance is reversed, depending upon which arrangement is best suited to the motor windings for the production of the maximum starting torque. Such matters are almost invariably determined by experiment, on account of the extreme difficulty of predetermining the starting performance to any degree of accuracy.[1] Some makers even arrange for the two windings to be connected in series for starting, but this method is confined to motors of small output. A further method makes use of the " shading coil " principle, in which approximately two-thirds of the stator pole pitch is surrounded by a short-circuited coil of large cross section having only a few turns. An e.m.f. of self-induction is set up in this coil by the action of the main flux, and the m.m.f. thus produced gives rise to an auxiliary flux which combines with the main flux to produce, in the manner already described, a rotating stator field which renders the motor self-starting. This method is very inefficient on account of the continuous losses in the short-circuited starting winding, a defect which has been overcome by bringing out the ends of the starting winding and short-circuiting them only during the starting period. So far as we are aware, this principle has not been employed in motors exceeding fractional horsepower outputs; its greatest application is in connection with fan motors, &c., where the starting torque required is small, and overloads are not normally encountered.

The single-phase induction motor starting problem is a very complicated one. For machines of medium outputs the best method is probably the split-phase method already described. Unfortunately, however, the output frame size efficiency is very low. This is on account of the fact that the stator slots containing the starting winding cannot be usefully employed for the running winding; thus the output of a motor carcase wound for single-phase is only some 70 per cent. of that obtainable from a corresponding three-phase wound carcase. Adequately to describe the complicated points in motor theory which are necessary for a thorough understanding of the starting problem would require more space than is available at present.[2] We pass on to an examination of other methods of starting.

2. *Single-phase Monocyclic Starting Devices.*—The " monocyclic " method seems to have been introduced by Steinmetz; it is described in his patents Nos. 620,988 and 620,989 of 1895, and is undoubtedly the best all-round method from the viewpoint of operating characteristics. In this method two impedances of different power-factors are employed, connected across the single-phase mains in series. From the mid-point of this circuit is connected one-phase of an ordinary three-phase induction motor, whose remaining two phases are connected to the single-phase mains.[3] This circuit arrangement results in the production of a polyphase system of currents in the three phases of the induction motor, and renders the motor capable of producing an appreciable starting torque, the actual value of which is dependant upon the circuit constants, and may be made a maximum by the suitable proportioning of the external circuit impedances. All the e.m.f's. produced in this system, with the exception of one in phase with the supply, are wattless, and there is thus only a single-phase supply of energy available. The interactions of these wattless e.m.f's. give rise, however, to the rotating magnetic fields necessary for starting, and the starting torque efficiency of the arrangement is actually very high.[4] It is possible to employ either squirrel-cage or slip-ring machines in this way. In the case of squirrel-

[1] A theoretical examination of the split-phase method of starting is contained in the author's short treatise on " The Operation of Single-Phase Induction Motors," published by the A.E.S.D.

[2] The interested reader will find much of value in the paper on " The Starting of Single-Phase Induction Motors," by F. A. Lauper, *Journal* I.E.E., Vol. 65, p. 160.

See also a valuable article on " Single-Phase Induction Motors and the Starting Problem," by F. W. Davies, ELECTRICAL REVIEW, January 4th, 1924.

[3] There are numerous modifications of this principle. Several methods are described in the author's article on " The Operation of Polyphase Motors from a Single-Phase Supply," in the ELECTRICAL REVIEW, October 12th, 1923.

[4] The theory of this circuit arrangement is examined mathematically in the author's tract on " The Operation of Single-Phase Induction Motors," pp. 20-24.

cage motors the best starting effects are obtained where high starting currents are allowed, but if the starting current is restricted to low values the monocyclic method does not quite give such good starting effects as the ordinary split-phase method. In the case of slip-ring motors with suitable rotor resistances the effects are converse, the best starting conditions, compared with the split-phase arrangement, being obtained with the lower starting currents.

There are numerous methods of starting based on the foregoing principle.[5] In one of these a condenser takes the place of one of the impedances, the resulting starting torque efficiency with this arrangement being superior to that of the polyphase induction motor. Such an arrangement is, however, rarely employed in practice, on account of the much greater bulk and expense as compared with the two impedances. It is usual entirely to disconnect the two impedances from the supply when the motor has accelerated to full speed; by this means the losses in these parts of the circuit are dispensed with, and it is possible to employ impedances of relatively small size, on account of the short period of duty. A device which has found a large sphere of use in America, but has not, as far as we are aware, appeared in this country, makes use of a condenser connected across two terminals of a three-phase machine. One of these two terminals and the free terminal are then connected to the single-phase supply. This circuit arrangement renders the motor self-starting, with an appreciable starting torque and high starting torque efficiency when a suitable condenser is used. It is usual with this arrangement to leave the condenser connected during the running period, the condenser being designed so as to compensate for the lagging magnetising-current of the motor, and hence produce approximately unity power-factor.

One of the difficulties with such starting devices as we have described is occasioned by the fact that the motor circuit constants alter, for various reasons, during the accelerating period. It is thus impossible to obtain the desired conditions throughout the entire speed range, and some sort of compromise is usually effected when designing the starting gear. In the case of motors with a low-resistance short-circuited rotor, the total motor impedance and the power-factor at standstill are low, and increase very rapidly with increasing speed. With motors having a high-resistance rotor the conditions are converse, the power-factor in particular changing less from standstill to full speed; thus the effect of changing power-factor of the motor circuits upon the circuit constants of the starting device is not so great in the latter case. Unfortunately, however, high-resistance rotors are less efficient at normal speed, as they produce greater changes in speed for variations of torque than those of low resistance. It will be appreciated that this is an important point in view of what has been said with regard to the speed-torque characteristics of the single-phase machine. In practice, conditions are quite easily obtained wherein a considerable starting torque is developed, but falls off to zero and then reverses at some intermediate speed, so that the motor is unable to attain full speed with the starting device in circuit.

From the foregoing remarks it is evident that many difficulties beset the path of the designer of single-phase motors. It becomes easy to agree with the dictum of a well-known authority on this subject :—

> "The single-phase motor has been the subject of perhaps more theoretical speculation than any other dynamo-electric machine, and the reason for it is, undoubtedly, that it is in its functioning the most complicated of all dynamo-electric machines."[6]

The subject is undoubtedly a very extensive and difficult one; it has been approached from every conceivable angle by the numerous investigators in America, France, and Germany, as well as this country, although the amount published on the subject in England has been very small. In connection with the history of the theory, the names of Dr. Behn-Eschneburg, Georges, Potier, Prof. Steinmetz, and Dr. A. Thomaelen are outstanding. To Dr. Thomaelen we owe the first highly accurate graphical analysis based on the two-field theory originally suggested by Ferraris.[7]

A further method of operation, which makes use of a well-known principle connected with polyphase motor operation, may be included in the category of monocyclic devices :—

If one terminal of a three-phase induction motor running under normal conditions is disconnected from the supply, the machine will continue to operate with a reduced overload capacity. These conditions represent what is known in practice as "single-phasing," which results in reduced speeds under normal load in three-phase working, and serious overheating of the motor windings if the normal full load of the motor is sustained for any appreciable period.

When running under these conditions, a tertiary e.m.f. is induced in the idle phase of the stator winding by the combined action of the stator and rotor currents. This tertiary e.m.f. is essentially wattless, as already explained above, but combines with the supply e.m.f. to produce conditions approximating to a three-phase distribution of m.m.f. in the motor windings. It follows that a second three-phase machine, when connected to the terminals of a motor operating in this manner, will be self-starting and able to run up to speed without any special starting device. The starting torque developed by the second motor is, of course, not so great as would be obtained from the machine on a three-phase system, but is sufficiently in excess of the starting torque of a split-phase motor to recommend this system where a high starting torque is required on a single-phase supply. In practice this method has been used on large single-phase railway systems, where it has given satisfactory service, chiefly on account of the simplicity of the control arrangements. It has the disadvantage for traction work that the pilot motor or "phase convertor," as it is then called, represents an idle dead weight, as compared with other systems, but the economies effected by the simplicity of motors and control gear usually compensates for this defect. An instance of the useful application of the method occurs in connection with the operation of a number of single-phase motors in fairly close proximity to each other. In such a case, one of the machines, preferably of large size, may be started up first, by any of the monocyclic devices described above, it being then used to supply a three-phase system of e.m.f.'s to the remaining motors; these will require merely some form of direct switching device for connecting them in turn to the pilot motor leads. All the machines can be of the normal three-phase type, so that considerable economy is effected in both motors and control gear by the use of this method, apart from the superior operating characteristics obtained by its means.

3. *Single-phase Commutator Motors.*—Anything approaching a complete discussion of the theory and application of the numerous types of single-phase commutator motor would require the scope of a large book. As in the case of other single-phase machines, this type has been the subject of considerable practical and theoretical investigation, with the result that the number of types available is very large, covering almost every conceivable method of operation.

In modern practice, the most usual types are represented by two categories :—

(1) The plain series motor.
(2) The repulsion motor.

Of these two types, the latter is probably most frequently encountered.

The chief difficulty with all a.c. commutator machines rests on the question of commutation. This is due to the

[5] They are discussed very fully in a mathematical way by Prof. C. P. Steinmetz in his paper on "The Single-Phase Induction Motor," *Transactions*, A.I.E.E., Vol. 15, 1898.

[6] From a paper by E. F. W. Alexanderson, in the *Transactions*, A.I.E.E., Part I, 1918, p. 691.

[7] See the author's tract, *loc. cit.*, pp. 12-13; also the author's paper on the "General Theory of the Single-Phase Inductor Motor," *World Power*, Vol. 6, October, 1926, pp. 193-196, where the two-field theory is examined mathematically.

fact that any rotor coil short-circuited during commutation by the brushes acts in exactly the same manner as the short-circuited secondary of a transformer, thus giving rise to a large local current in the coil, which has to be commutated in addition to the current normally carried by the coil.[8] It follows that unless suitable precautions are taken for nullifying or reducing this short-circuit current, destructive arcing is likely to be experienced at the brushes. This condition imposes restrictions on the design which are difficult to overcome. One of the first suggestions for improving commutation was made by B. G. Lamme,[9] who put forward a method employing commutator leads of high resistance, which were intended to reduce the value of the short-circuit current in rotor coils undergoing commutation. This arrangement proved satisfactory from the electrical point of view, but mechanical difficulties were experienced due to the excessive vibration of the traction motors with which the arrangement was first tried. There is also the difficulty of accommodating the resistance connections in the rotor, in addition to the normal rotor windings, a difficulty which renders manufacturing costs very high. A further objection to the local commutation currents, in the case of repulsion motors, refers to their effect on the motor torque; during commutation, the magnetic axis of the rotor coil is at right-angles to the brush axis. In accordance with the dynamical laws of self-induction, it follows that a torque is exerted on the coil, tending to place its magnetic axis in quadrature with the field. This torque is in opposition to that due to the remaining portions of the rotor winding, and the result is a reduction of the total rotor torque.

The methods now employed for improving commutation make use of auxiliary windings on the stator, arranged in a similar manner to the commutating windings on d.c. machines. These windings are so distributed and connected that an auxiliary flux is produced which reacts upon the flux producing the short-circuit current in commutated rotor coils. By such means it is possible to obtain practically sparkless commutation at any required speed. Difficulties are, however, experienced in the case of variable-speed machines, such as are used for traction work and in cases where large fluctuations of load take place, on account of the variation of the commutating pole flux and the short-circuit current with varying load conditions.

Perfect commutation can only be obtained by the complete elimination of the short-circuit current under the brushes and the reversal of the load current in the rotor coils during commutation. For the first condition an auxiliary flux is required in quadrature with the primary flux, and for the second condition is required a further auxiliary flux, in phase with the primary flux; thus the resultant commutating flux is out of phase with the primary e.m.f. The various possible ways of exciting the two auxiliary fluxes has resulted in the development of the large number of types of motor at present available. An arrangement making use of a non-inductive resistance shunting the interpole windings has been suggested by Latour and Dr. Behn-Eschenberg for producing the conditions normally provided by the two compensating fluxes. The arrangement employing an interpole on the stator fed from the rotor for the neutralisation of the transformer e.m.f., and a further interpole connected across the field coil for producing the current-reversing e.m.f., is due to Arnold. There are at present some twenty different types of single-phase commutator motor in existence, all of which have particular characteristics recommending them to certain classes of duty. In the repulsion motor class there are two different types :—

(1) The plain repulsion motor.
(2) The compensated repulsion motor.

During starting, and at low speeds, there is little difference between the commutation of the plain series motor and the repulsion type. The latter is, however, much better in this respect at speeds approaching synchronism, and for this reason has found a much wider sphere of use. It is possible to obtain a limited amount of speed variation on the plain repulsion motor by shifting the brush position, but speed control of the series motor is rendered impossible by the bad commutation.

The compensated repulsion motor in its best known form is due to Latour, Wightman, Winter, and Eichberg, It is provided with an additional set of commutator brushes, which are fed from the secondary of a transformer whose primary is in series with the stator winding. In this way the e.m.f. of self-inductance of the motor field is reduced from the value corresponding to primary frequency, as in the case of the plain repulsion motor, to a value corresponding to slip-frequency; it follows that at hypersynchronous speed this e.m.f. is negative, and it is possible to obtain unity power-factor or even to draw leading currents from the line with this type of machine.[10]

### Conclusion.

The statement made at the commencement of this article concerning the number of single-phase supply systems at present in existence is probably at variance with the opinion of many; we do not wish to enter into a discussion on this point. It will, no doubt, be agreed that there is a sufficient number of such systems available to lend importance to a discussion of single-phase motors in their practical application for commercial purposes. There is, however, a much wider scope for the single-phase motor in connection with traction work and other heavy-duty applications, where the saving of supply lines is an important feature, and where simplicity in motors and control gear is of importance. It is hoped that the foregoing discussion of the general aspect of the problem will make clear the fact that there are few instances of power application which are unsuited to single-phase working.

[8] See the author's article on "The Single-Phase Repulsion Motor," *Electrician*, May 1st, 1925.

[9] U.S. Patents No. 758,667 and No. 758,668, May 3rd, 1904.

[10] The mathematical theory of both the plain and compensated types of repulsion motor is given in the author's paper on "Operating Characteristics of Single-Phase Repulsion Motors," *World Power*, Vol. 4, December, 1925, pp. 306-313.

### Lightning and Transmission Lines.

During the course of a paper recently read at a meeting held at Toulouse on "Lightning and Electric Transmission Lines" by Mr. C. Dauzere, director-general of the Globe Physical Institute and Observatory, on the summit of the Pic du Midi Mountain, France, the author stated that he had made experiments to discover the cause of storms and lightning, and had found that certain places, depending on the geological formation of the ground and where negative ions were produced in abundance, were dangerous. He urged that in locating electric power transmission lines regard should be had to the avoidance of such dangerous places. There was still much to be done in the study of electrical phenomena in the air in order to give greater security to electrical installations. As a result of the paper, the Toulouse section of the French Association of Electricians has adopted a resolution recommending that all information regarding accidents arising from lightning, hail, and thunderstorms be concentrated at the Pic du Midi Observatory at Bagnères-de-Bigorre, in the Upper Pyrenees, and that an active campaign should be organised to induce public authorities, electric traction and electricity supply undertakings, and all technical and agricultural societies to assist in making the observatory a centre of information about the effects of lightning and storms.

# Electricity for the Home.

**Notes on the progress made in domestic electrification by two comparatively large municipal electricity supply undertakings.**

## Enterprise at Fulham.

THE Metropolitan Borough of Fulham commenced its scheme for the development of the domestic load as recently as November last year, at the same time as its new showrooms were opened. It has now out on circuit over 160 cookers, 260 radiators, 170 kettles, 380 irons, 35 water heaters, and 7 wash boilers. This is an achievement for which Mr. A. J. Fuller, borough electrical engineer, and Mr. N. A. Chesterfield, commercial superintendent, have reason to be proud, and we offer our congratulations on the results of their efforts. Broadly, the business-getting policy of the undertaking may be said to follow two general lines of encouragement to consumers: attractive hire schemes and tariffs, and demonstration work designed to introduce a personal element. Under the first heading any sort of domestic electrical apparatus is hired out on the basis of 6d. in the £ of cost price per quarter; all the apparatus is maintained for fair wear and tear. Energy is supplied for lighting at 3½d. per unit, and for other domestic purposes at ¾d. A combined tariff embodies low rental and lighting-point charges and a unit charge of ¾d. A point of interest is that the combined tariff is only available to those consumers who install a cooker. The use of an electric kettle with every cooker is strongly urged by the undertaking, and provision is made on the cooker control board in every case for plugging in a kettle, iron, and so on. The wiring in connection with the hiring schemes is put in free up to 30 ft., but in the case of radiators only for living rooms on the same floor as the kitchen. It is interesting to note that the energy sold for power, including domestic supplies, by the undertaking during the quarter ended June 30th last was 3,098,398 units, an increase of 589,971 units over the figure for the corresponding quarter of 1928, and that the increase is attributed to the operation of the undertaking's hiring schemes.

The basement of the showrooms is devoted to demonstration work. It is an excellent place for the job. Some idea of its spaciousness and general suitability may be gathered from fig. 1. The facilities afforded in this connection have resulted in considerable help being given by the manufacturers of the apparatus. The Jackson Electric Stove Co., Ltd., Messrs. Siemens Electric Lamps and Supplies, Ltd., Metro-Vick Supplies, Ltd., and the Revo Electric Co., Ltd., are all rendering considerable aid and adding to their own sales by giving periodical demonstrations in cooking, heating, and so on, in fortnightly series. As might be expected, the popularity of the various makes of apparatus varies from time to time with the different demonstrations. Out of the holiday season, by the aid of representatives of the Electricity Committee, parties are brought together on one afternoon every week or so to lecture-demonstrations, and are tactfully "guided" into interesting discussions. Much good has resulted from this work, especially in the way of "spreading the tidings" between the consumers and prospective consumers themselves.

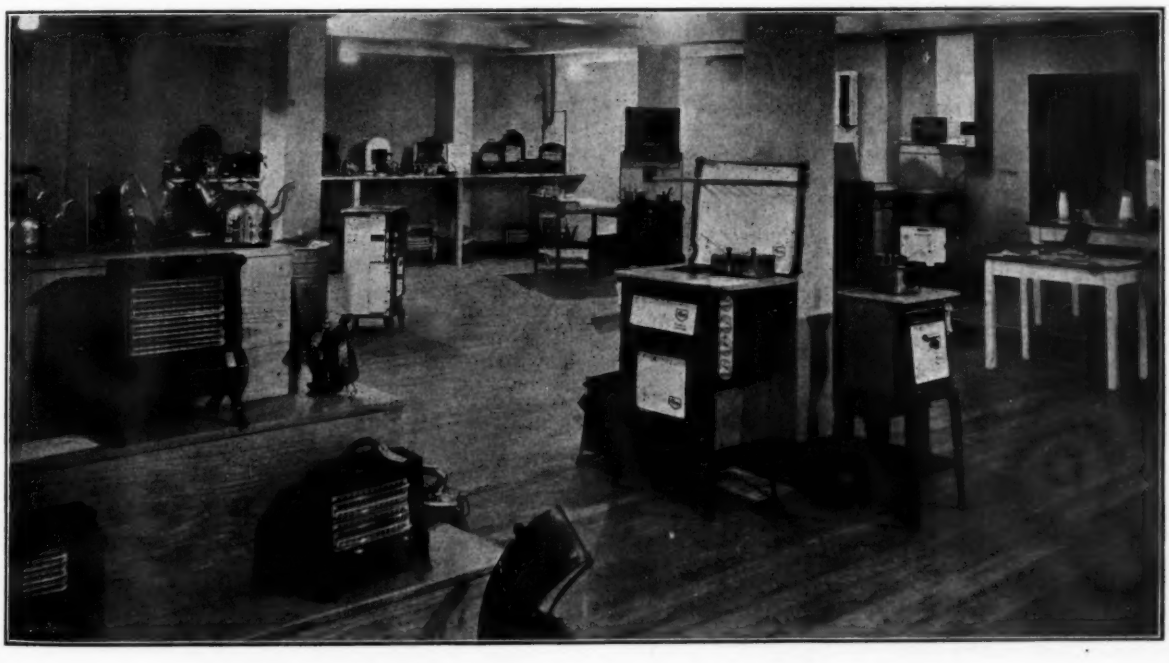

**Fig. 1.—Demonstration Room in Fulham's New Municipal Showrooms.**

Much is to be learned by manufacturers about the correct or desirable construction of apparatus from the user. In this connection we learn that consumers at Fulham have shown a dislike for the grill in the oven in the small types of cookers that have been introduced in recent months. Fig. 2 shows one of the cookers which is being used at Fulham. It is the Revo "Maisonette" model which has been designed for a family of up to

six persons, and especially for housing schemes, in which capacity it has met with success. Exactly similar in construction to the larger "Revo" models, this cooker is built to stand rough usage. Side and bottom heating are employed, together with other "Revo" features, such as a porcelain-enamelled oven, large hot cupboard with spring-loaded door, porcelain enamelled hob, fast boiling plate, domed feet, and so on.

A word of appreciation should be made on Fulham's new showrooms and offices. In the showroom proper on the ground floor selected pieces of domestic apparatus

**Fig. 2.—A Cooker used at Fulham.**

and fittings are so displayed as to give the impression that they are the normal furniture of the room; there is no overcrowding. A couple of show cases are so positioned that they command the attention of every entrant, and, what is of the utmost importance, every consumer who visits the premises to pay his quarterly bill must pass through this room.

It appears to be the general experience of the consumers at Fulham that electricity at $\frac{7}{8}$d. per unit for domestic purposes is on a par with the gas supply at 8.6d. per therm. It is believed that this is the result particularly of encouraging the use of an electric kettle with each cooker. The maintenance costs of the apparatus on hire have so far proved to be almost negligible, and this is attributed to the use of the new-pattern totally-enclosed boiling plates.

A well-produced and interesting pamphlet is always readily accepted by the public, and in this connection a particularly worthy effort has been made by the Fulham undertaking. The booklet opens with a very interesting article, "The Milestones and Romance of Lighting," by Mr. Chesterfield. This article traces the development of artificial lighting from the rush-light candle in the first century to the modern electric lighting of to-day. In addition to information directly concerning the undertaking, such as the tariffs in vogue, hiring rates, and so on, there is much information of a more general character; for instance, a section on "How to read your meter" should be very useful to consumers.

Business-getting is practised in a modern and tasteful way at Fulham; but that this is so is not surprising when one peruses the paper, "Electricity—Business Getting," read by Mr. Chesterfield before the meeting of Municipal Sales Representatives of London Area Undertakings in February last. A very interesting point in connection with this paper is the suggestion contained therein for furthering the teaching of the use of electricity in the home in schools; we understand that the present activities of the Electrical Association for Women in that direction arose out of the suggestion referred to.

### Domestic Supply at Hammersmith.

By reason of its position Hammersmith is a difficult place in which to develop a domestic load for electricity supply. That, however, gives the results achieved added interest. There is at present a domestic load at Hammersmith of some 2,500 kW, of which 500 kW was obtained during the past financial year. Much of the increase is attributed to the issue to prospective consumers of a brochure entitled "Your Electricity Undertaking" by the department. Full information as to the tariffs in vogue and the hire charges adopted for various classes of electrical domestic apparatus is given. A feature of the booklet is a section, "Economise by using more current," in which are shown the advantages to consumers of adopting the two-part tariff in vogue, which is at present $7\frac{1}{2}$ per cent. per annum on the ratable value of the property, or £6 per kW of apparatus installed, plus $\frac{3}{4}$d. per unit consumed. Another interesting tariff at Hammersmith is one which provides for a charge of 1d. per unit for energy consumed between 6 a.m. and 9 p.m., and $\frac{1}{2}$d. per unit for the consumption between 9 p.m. and 6 a.m. This tariff is allowed for apparatus with a capacity of not less than 6 kW, and embodies a charge of 5s. per quarter as rent for the necessary time switch. There are at present about 2,370 consumers at Hammersmith under the assisted wiring scheme. At the time of our visit to the undertaking there were out on hire 105 radiators, 47 cookers, and 197 irons. Over 100 irons were let out on hire during the past year. Jackson and G.E.C. cookers are adopted by the undertaking for hiring purposes, Premier and G.E.C. radiators, irons and kettles, and Sadia water heaters. Premier radiators have proved very popular among the Hammersmith consumers, principally, it is believed, on account of the attractive glow of the reflector. Further, the fact that Premier Electric Heaters, Ltd., take back the radiators at the end of the season and re-

**Fig. 3.—A Popular Fire at Hammersmith.**

plate them has made an appeal to the undertaking. The popular model of "Premier" fire at Hammersmith is the "Countess" fire, fig. 3. This fire is built on graceful lines. The fire bar is in three separate sections, each of $\frac{3}{4}$-unit capacity, two being controlled by switches mounted on the body, and the centre one connected direct to the terminals for control by the wall plug-switch. The sides and legs are of fine-grain cast-iron, and the reflector is of solid copper with a figured surface. This treatment of the reflector enormously enhances the appearance of the fire when in use, compared with plain polished copper. The overall size is $19\frac{1}{2}$ in. high by $19\frac{1}{2}$ in. wide by $8\frac{1}{2}$ in. deep. The total weight is 15 lb.

# Business and Industrial Notes.

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.**

### "Service" by an American Company.

*Electrical Merchandising* states that last year the Service and Repair Department of the Commonwealth Edison Co., Chicago, answered 104,255 calls from electrical appliance users. Its repair shop "serviced" 23,041 devices, while the force of 57 outside men, in addition to other duties, took care of the remaining 81,214 in the homes of customers. It is said that 85 per cent. of the breakdowns are due to natural wear from constant use and not to fundamental defects in design. In this connection it is of interest to note that manufacturers of electrical appliances are availing themselves of the Commonwealth Edison Company's experience and the splendid opportunity for studying appliances, after they have been subjected to the indiscriminate use of thousands of customers, by examining them in this service laboratory. Old cords, for example, are saved in order that cord manufacturers may improve their product by first-hand observation of their defects.

### Extension of the G.E.C. Cardiff Branch.

Since the Cardiff branch of the GENERAL ELECTRIC CO., LTD., was inaugurated 29 years ago, there have been one removal and six extensions. The original staff consisted literally of a man and a boy; to-day 200 are employed at the branch, and there are sub-branches at Bristol and Swansea. The latest extensions have been of a substantial nature, sufficient to warrant their being formally opened by the Lord Mayor of Cardiff on Thursday last week.

The premises are now arranged in three separate blocks for management purposes and general convenience. The centre block comprises the trade counter, a series of showrooms devoted to industrial and domestic heating and cooking appliances, general and industrial lighting fittings, "Osram" lamps, radio demonstration showrooms, mining gear, stage lighting and other electrical equipment, wires and cables, and well equipped stores. The north block houses the administrative offices, a travellers' conference room and lecture hall, and lamp stores. The south block is devoted to wireless and general stores, receiving, dispatch, and special express and general transport arrangements. Electrically the premises are equipped with the most up-to-date apparatus; the main distribution board on the ground floor is capable of carrying a load of some 70 kW. In the electrical fittings showrooms are thousands of lighting fittings shown in separate groups or rooms. One section is devoted to a display of multi-coloured panelled and moulded glassware pendants, brackets and floor standards fashioned in chaste bronze metal work, oxidised silver, &c.

**Fig. 1.—The Castle Arcade Entrance.**

Other sections are devoted to alabaster ware, pendants, electroliers and other handsome forms of electric lighting furnishings, vellum, parchment, silk, and glass shades, &c. Separate showrooms are devoted to industrial and domestic heating and cooking appliances, as well as general and industrial lighting fittings and demonstrations of lighting by "Osram" lamps. Here also mining, haulage and winding gear, flame-proof switchgear, stage lighting and other electrical equipment for kinemas and theatres, wires and cables, and various apparatus for industrial electrification are on view. The electric household appliances and wireless showrooms are equipped on the most up-to-date lines. Radio demonstrations are given in a Tudor room. Large stocks are available and the company's service to the electrical undertakings, contractors, traders, and dealers in the area will be considerably improved.

The opening ceremony was of a novel character. The Lord Mayor, by removing a black cover from an "Osram" photo cell, flooded the darkened room with light. This was so much

**Fig. 2.—One of the New Showrooms.**

appreciated that he had to repeat the operation two or three times.

Mr. M. J. RAILING, joint managing director, thanked the Lord Mayor, and presented him with an inscribed table standard. A luncheon followed the ceremony.

### The E.D.A. Outlet Campaign.

During the current week Lt.-Col. W. A. Vignoles, D.S.O., director and secretary, and Mr. V. W. Dale, business manager, of the British Electrical Development Association, have been explaining the methods and objects of the Association's Electric Homes (Outlet) Campaign in London, Manchester, Leeds, Birmingham, Cardiff, Glasgow, Edinburgh, Newcastle, and Bristol. The audiences have consisted of men and women in all branches of the electrical industry, and the chairmen have been, generally, the chief engineers of the local electricity supply undertakings.

### Employment during August.

The September *Ministry of Labour Gazette* says that employment in the engineering industry during August was slack on the whole and showed a decline in all sections. In electrical engineering, however, employment was still fairly good. In the engineering industry, as a whole, the number of unemployed increased from 81,362 to 90,565, raising the percentage from 8.3 to 9.3. The electrical section showed an increase from 3,248 to 3,365, the proportion of unemployed rising from 4.1 to 4.2 per cent. Conditions in the electric cable, wire, and lamp manufacturing group remained about the same, the number of unemployed increasing from 4,164 to 4,198, and the proportion from 4.8 to 4.9 per cent. There was an improvement in the electrical wiring and contracting industry; the number of unemployed decreased from 1,085 to 1,019, and the percentage from 7.0 to 6.6.

### New Belgian Companies.

The following are among the companies recently formed in Belgium:—The Société Générale d'Accumulateurs, Antwerp, capital 750,000 fr.; the Société Franco-Belge des Laminoirs et Tréfileries d'Anvers, Brussels, capital 60 million fr., to manufacture wires of all kinds, particularly electric cables; and the Cie. Européenne pour Entreprises d'Electricité et d'Utilité Publique ("Europel"), Brussels, capital 500 million fr.

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## Civic Week Celebration at Bolton.

During the current week Bolton has been celebrating its first civic week, and a full programme of attractions has been arranged. Throughout the week a motor lorry fitted with attractive electrical devices has been daily touring within a 60-mile radius of the town to broadcast the invitation: "Come to Bolton." Various Bolton works have been open to inspection by the public, and each day parties have been taken round the Corporation electricity works. The principal feature of Civic Week, however, is the Arts and Crafts Exhibition. Most of the Corporation trading departments have stands, including, of course, the Electricity Department, which gives continuous demonstrations of various types of domestic electrical appliances for heating, cooking, washing, ironing, water heating, &c. Apparatus is also shown for chicken rearing by electricity, and there are fittings suitable for canteens, shop and garage heating, refrigerators, &c. Examples of electrical installations carried out by the department are on view, as well as numerous photographs of the Back-o'-the-Bank generating station. Messrs. John Booth & Sons have on view examples of electric welding, and Messrs. T. Francis & Sons a patented searchlight, which is constructed to penetrate through fire and smoke.

## New Catalogues and Lists.

Messrs. J. J. EASTICK & SONS, Eelex House, 118, Bunhill Row, E.C.1.—A show card dealing with "Eelex" treble duty terminals.

SHIPTON AUTOMATIC TELEPHONE SYSTEM, LTD., 2-3, Caxton House, Tothill Street, Westminster, S.W.1.—An illustrated folder drawing attention to the company's automatic telephone system, and giving a list of installations.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—A booklet advertising "Magnet" electric fires and household appliances. Illustrated and priced. The Osram G.E.C. Bulletin for September contains, in addition to notes on the company's activities and products, articles on the International Lighthouse Conference and heating orchid houses.

ELECTRIC HEATING & HARDWARE, LTD., Crown Works, Berkley Street, Birmingham.—An illustrated booklet of "Glowincoal" and "Boomerang" electric fires. Priced.

IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, E.C.4.—A leaflet describing the Igranic-Pacent "Phonomotor" for electric gramophones. Illustrated and priced.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4.—A folder, reproducing in colour, the poster entitled "The Popular Pair," which advertises Pearl and Opal lamps; a catalogue illustrating "Cosyglo" electric coal fires; and a booklet illustrating "Xcel" electric domestic appliances, including electric irons, screen and bathroom fires, kettles, toasters, &c.

PROVINCIAL INCANDESCENT FITTINGS CO., LTD., Pifco House, 71, High Street, Manchester.—A comprehensive catalogue (pp. 144) of the company's range of electrical goods, which includes sections dealing with flashlights, wireless apparatus, lighting fittings and accessories, vacuum cleaners, &c. Fully illustrated and priced.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester.—Two well-produced brochures, Nos. 1976/3-1 and 1976/5-1, describing, respectively, the construction of the freight and passenger locomotives supplied for the Great Indian Peninsula Railway. Details are also given of the electrification of the railway, with a map of the lines electrified. In addition to the descriptive matter, a number of sectional drawings and excellent illustrations showing the electrical apparatus employed on the locomotives are included. Both brochures contain a comprehensive list of the company's products.

Messrs. BELLING & CO., Bridge Works, Southbury Road, Enfield.—A folder containing illustrations, details and prices of new and improved "Belling" fires.

Messrs. VERITYS, LTD., Aston, Birmingham.—A comprehensive catalogue of some 500 pages, fully illustrated and priced, dealing with the company's motors, dynamos, switchgear, fittings, &c. It has a strong adjustable binder, so that additional sheets can be inserted. Reference is facilitated by a thumb index to the various sections, and indexes in the front of each section to their contents. Publication No. 1,067 (pp. 87), giving particulars of the company's pedestal, cabin and ceiling fans. Fully illustrated and priced.

MESSRS. UNDERWOOD (MANCHESTER), LTD., 1, Dickinson Street, Manchester.—Catalogue No. 4 of the company's lighting fittings, vacuum cleaners and electric signs. Illustrated and priced.

EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, E.C.4.—A radio catalogue, the first produced in the name of "Ediswan" covering the products of the company, the British Thomson-Houston Co., Ltd., and Metro-Vick Supplies. It deals with loud-speakers and other sound reproducing equipment, and the question of output transformer ratio for moving-coil speakers. Particulars of a hire-purchase scheme are also given.

Messrs. ALFRED WISEMAN, LTD., Glover Street, Birmingham.—Two catalogues of gear and gear cases, and insulators for crane and mine fittings. Illustrated and priced.

GASIFIED PULVERISED FUEL (G.P.F.), LTD., Canada House, 4-5, Norfolk Street, Strand, W.C.2.—A number of folders outlining the G.P.F. systems of pulverised fuel firing, including sectional drawings of the arrangement of pulverised fuel plant, and illustrations of actual installations.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—A brochure forming a guide to the company's works, outlining its many activities. Some excellent illustrations of the various workshops are included.

CARRINGTON MANUFACTURING CO., LTD., "Camco" Works, Sanderstead Road, South Croydon.—An illustrated and priced catalogue of radio cabinets.

Messrs. WILLIAM GEIPEL, LTD., Vulcan Works, 156-170, Bermondsey Street, S.E.—An illustrated folder drawing attention to "Quead" electric cookers and boiling plates.

RADIO INSTRUMENTS, LTD., 12, Hyde Street, New Oxford Street, W.C.1.—A catalogue describing the company's radio sets and components including a three-valve screened grid all-mains receiver.

BRITISH INSULATED CABLES, LTD., Prescot, Lancashire.—Leaflet dealing with circular "Copperweld" overhead-line earth wires; also stay, catenary, and span wires.

REVO ELECTRIC CO., LTD., Tividale, Tipton, Staffs.—A catalogue of electrical domestic appliances, including fires, irons, kettles, hotplates, &c. Illustrated and priced.

## Floodlighting a War Memorial.

During the conference of the Association of Public Lighting Engineers which was held at Bournemouth recently, an installation for floodlighting the War Memorial was designed by Siemens Electric Lamps & Supplies, Ltd., and carried out by the Bournemouth Corporation Lighting Department to demonstrate the possibilities of floodlighting

**Bournemouth Memorial Floodlighting.**

public memorials. The installation comprises four 500-watt units placed inconspicuously in the corners of the surround. Siemens lamps and Siemens-Holophane floodlight projectors are employed. The accompanying illustration shows the excellent results achieved.

## Local Exhibitions.

ROCHDALE.—During the Trades and Industry Exhibition, held recently, the Town Hall was floodlighted by the Electricity Department. The chief lines of the building were picked out in coloured lights and these were continued up the tower to a level above the clock. The town's motto shone above the main entrance and was surmounted by the borough arms, both being worked in coloured electric lights. The exhibition hall was wired for lighting and power by Messrs. Fryer and Hartley, Ltd., who also had a stand at which they displayed and demonstrated the "Fryhart" public address system. The local service agents for "Exide" batteries, Messrs. Henry Tattersall, Ltd., exhibited a large range of batteries used for wireless and sound projection systems and for various domestic circuits. The largest individual exhibit was that of the Rochdale Corporation Electricity Department, which occupied five stands to display a comprehensive range of domestic electrical appliances.

PLYMOUTH.—Messrs. SPOONERS, of Plymouth, signalised the opening of a new and enlarged electrical department by special displays and demonstrations on September 16th, of electrical labour-saving devices, fires, irons, &c. Throughout the week a representative of the Metro-Vick Supplies gave demonstrations of electric cookers, and Messrs. Hoover, Ltd., demonstrated vacuum cleaners. Electric irons were offered on 14 days' free trial at special prices.

## Polish Foreign Electrical Trade.

During July last Poland imported "apparatus, conductors, and other electro-technical materials" to the value of 8,638,000 zloty (£200,000). Polish exports of this class were valued at 86,000 zloty (£2,000).

## Mr. Matthew Sloan on Mergers.

In the course of an address at the recent N.E.L.A. Convention, Mr. Matthew S. Sloan, president of the N.E.L.A., and of the New York Edison Co., and affiliated companies, gave his views on the effects of mergers and holding companies upon the electricity supply industry. He said that some people professed not to believe that mergers and holding company combinations in the utility field were actually being brought about as an economic necessity in order to provide better and cheaper service. They were apprehensive lest such combina-

tions, particularly of holding companies, might become a menace to the public interest through their size and financial power. Both those contentions, he maintained, were based on a misunderstanding of the economics of the business and the nature of holding companies and their part in the utility industry. "We can nullify the present criticism and disprove its allegations and suspicion by our own policies and practices. If public utilities obtain advantages and benefits from these mergers and consolidations and groupings of companies which result in profits, these profits should be split with the customer in lowered rates." He believed that this was being done wherever possible, as the falling price of electricity over the years showed. "For our own business welfare and as a duty we owe because we are public service organisations, it is necessary that we take such steps as are possible to improve our service, reduce our expenses, increase our sales. When mergers of operating companies help bring these things to pass, it is in the public's interest equally with our interest. When holding company management or control will enable the public utility to better its service, increase its sales, and put it in the way to lower its rates, that, too, is in the public interest as well as in the interest of the companies in point. And when these events take place it remains for us to prove by our deeds that benefits to the customers will accompany benefits to the companies."

## Bankruptcy Proceedings.

A. E. SHAPLAND, Chippenham Cottage, Exmouth, formerly 13a, High Street, Budleigh Salterton, Devon, electrical engineer.—The receiving order against this debtor was made on September 6th on his own petition, and his statement of affairs shows liabilities of £253 against assets of £56, leaving a deficiency of £197. The debtor attributes his failure to insufficient work; working too cheaply to secure a connection; a motor accident; and illness and deaths in his family. After serving an apprenticeship to an electrical engineer, he commenced trading in 1927 as an electrical and wireless engineer at a lock-up shop, with £70 savings. In April last he sustained an accident in which he lost the sight of his right eye while his memory was affected. While he was in hospital the shop was closed and the stock removed to his parents' house. He estimated his takings since September 6th, 1928, to be £300, with a gross profit of £75. Trade expenses were £130, and there was a net loss of £55. He states that he became aware of his position in February last, and since March he has worked as a journeyman electrician. The first meeting of creditors was held on September 20th at Exeter, when the case, being a summary one, was left in the hands of the Official Receiver as trustee of the estate. The public examination is to be held on October 17th at the Castle, Exeter. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Budleigh Salterton Electric Light Co., Ltd. ... | 25 | Cossor, Ltd. ... ... | 28 |
| British Thomson-Houston Co., Ltd. ... ... | 20 | Callender's Cable and Construction Co., Ltd. | 25 |

G. E. HINE, trading as the Wireless Maintenance Service, 17, The Promenade, Church End, and 28, Mayfield Avenue, Finchley.—The receiving order herein was made recently on the debtor's own petition. The first meeting of creditors was held on September 16th at 29, Russell Square, W.C.1, when, according to the statement of affairs submitted, there were liabilities amounting to £763 against assets of £47, leaving a deficiency of £715. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Bowdidge, E. A. ... ... | 100 | Edison Swan Electric | |
| Bowdidge, N. ... ... | 20 | Co., Ltd. ... ... | 68 |
| British Thomson-Houston | | Morris, D., & Son, Ltd. | 114 |
| Co., Ltd. ... ... | 22 | Sedgwick, J. D. ... ... | 65 |
| Dickson & Son, Ltd. ... | 62 | Sedgwick, L. M. ... ... | 20 |

F. WHITTLE, electrician, Westbourne Avenue, Bolton.—At his public examination at the Bolton Bankruptcy Court, on September 7th, this debtor attributed his failure to the strenuous competition existing between electrical concerns and the consequent shortage of work. His liabilities were £122, and assets £23, leaving a deficiency of £99. Debtor said that he had carried on business since 1912, when he began without capital. Prior to 1927, the weekly profits averaged £3; afterwards they fell to half that amount due to similar businesses opening in the town, and to the Corporation commencing to carry out electric lighting installations on the hire-purchase system. The examination was closed.

T. E. WOODHEAD, electrical factor, Central Drive, Blackpool. This debtor was examined at Blackpool Bankruptcy Court on September 20th. Liabilities were £445, and assets £247. Defendant said he had carried on a wholesale business at Blackpool since 1920. He had not had any capital in the business. He attributed failure to "extravagance in living, betting losses, keen competition in trade, supply being greater than demand, and some bad debts." The hearing was adjourned.

E. G. M. PAGE, dealer in wireless sets and accessories, 46, Bohemian Road, St. Leonards-on-Sea.—Receiving order made September 11th on debtor's own petition.

W. GREEN, wireless dealer, 3, York Street, Stourport.—Receiving order made September 6th on debtor's own petition. First meeting held September 20th at the Lion Hotel, Kidderminster. Public examination, October 1st at the Town Hall, Kidderminster.

H. HOLMES, electrical contractor, &c., 60, Wards End, Loughborough.—First and final dividend of 4s. in the £ payable at the Federation Chambers, Wheeler Gate, Nottingham.

G. F. A. STONE (Stone Manufacturing Co.), electrical accessories manufacturer, 108, Great Saffron Hill, E.C.—Receiving order made September 12th on a creditor's petition. First meeting held September 25th. Public examination, October 29th, both at Carey Street, W.C.

A. SANDGROUND, wireless factor, 32a, Allerton Road, Lordship Park, N.—Application for discharge to be heard October 16th at the Court House, Upper Edmonton.

H. W. BEESLEY, wireless engineer, &c., High Street, Brackley.—Last day for proofs for dividend, October 2nd. Trustee, Mr. G. Mallam, 37, Cornmarket Street, Oxford.

R. HORSFALL (Harrison & Horsfall), electrical engineer, Midland Street, Barnsley.—Last day for proofs for dividend, October 1st. Trustee, Mr. C. H. Baker, Standard Buildings, City Square, Leeds.

R. BLOOD, wireless dealer and electrician, 44 and 46, Station Road, Padiham.—Last day for proofs for dividend, October 2nd. Trustee, Mr. J. W. Carter, Official Receiver, District Bank Chambers, Blackburn.

J. H. B. TATTERSALL (H. Tattersall), electrician, &c., 456, Burnley Road, Scout Bottom, Waterfoot, Lancs. Receiving order made September 18th on debtor's own petition.

F. G. WHEELER, electrical engineer, Wychwood, Broadlands Avenue, Shepperton, Thames.—Application for discharge to be heard on October 18th at the Assize Court, Kingston-on-Thames.

W. G. HOLMES, wireless and electrical engineer, 42, Walcot Street, Bath.—Trustee, Mr. H. Ashton, official receiver, 26, Baldwin Street, Bristol, released September 13th.

R. L. BROCK (R. L. Brock & Co.), electrical engineer, 5, Bedford Row, Tavistock Road, Plymouth.—Last day for proofs for dividend, October 5th. Trustee, Mr. J. S. B. Hole, 240, High Holborn, W.C.

## Company Liquidations.

FRANKLIN EBONITE CO., LTD., Franklin Street, Salford, Lancs.—A meeting of the creditors of this company was held on September 19th at the offices of Messrs. Greenhalgh, Sharp and Co., 30, Brown Street, Manchester. Mr. H. Sharp, the liquidator, submitted a statement of affairs which showed ranking liabilities of £841, of which £787 was due to the trade and £39 to cash creditors, whilst the bank was scheduled for £16. The assets comprised stock, £150; book debts, £181; and machinery, plant, fixtures, &c., £936, valued at £250, making a total of £581. After allowing £62 for preferential claims, and £297 due on debentures, the net assets were £222. The liquidator reported that the company was registered in May, 1926. Down to July 27th last, the company's trading resulted in a net loss of £651, and on that date Mr. G. R. Woollard was appointed as receiver and manager by the debenture holders. A resolution was passed confirming the appointment of Mr. Sharp as liquidator and an advisory committee of the principal creditors was also appointed.

COUNTY ELECTRICAL & WIRELESS STORES, LTD., Garrick Yard, St. Martin's Lane, W.C.2.—Under the compulsory liquidation of this company the statement of affairs shows liabilities of £4,577 expected to rank for dividend against net assets valued at £440. The following are the principal creditors:—

| | £ | | £ |
|---|---|---|---|
| Aeonic Wireless Co. ... | 128 | Houghton Butcher (Gt. | |
| Barnetts, Ltd. ... ... | 70 | Britain), Ltd. ... ... | 228 |
| Dallas, J. E., & Sons, | | Marx, O. ... ... ... | 51 |
| Ltd. ... ... ... | 52 | Meuse, Smith, Ltd. ... | 50 |
| E.K. Development Co., | | Oldham & Son, Ltd. ... | 95 |
| Ltd. ... ... ... | 145 | Philips Lamps, Ltd. ... | 172 |
| Electramonic Co., Ltd.... | 130 | Rolls-Caydon Sales, Ltd. | 72 |
| General Electric Co., Ltd. | 115 | Rooke, C. W., & Co. ... | 89 |
| Hambling, Clapp & Co., | | West, F. P. ... ... | 31 |
| Ltd. ... ... ... | 589 | Stokes, J. F. ... ... | 54 |

ELECTRAMONIC CO., LTD.—A petition for the winding up of this company has been presented to the High Court by Celestion, Ltd., radio manufacturers, Celestion Works, London Road, Kingston-on-Thames, creditors, and will be heard in London on October 15th.

BRITISH ACCUMULATOR CO., LTD.—A meeting of members is called for October 26th at the liquidator's office, Netherwood Chambers, Bradford, to hear an account of the winding up from the liquidator, Mr. E. B. Rawlinson.

RHAYADER ELECTRIC LIGHT & POWER CO., LTD.—Winding up voluntarily. Liquidator, Mr. J. Stephenson, Victoria Hall, Llandrindod Wells. A meeting of creditors was held on September 20th at Victoria Hall. (This notice is purely formal as all creditors will be paid in full.)

KNIVETOWN ELECTRIC WIRE CO., LTD.—A meeting of members is called for October 23rd at 24, Basinghall Street, E.C., to hear an account of the winding up from the liquidator, Mr. S. W. Tubbs.

## Dissolution of Partnership.

C. & P. ELECTRICAL & PLUG Co., electrical engineers and sparking plug manufacturers, Cottingley Bridge, Bingley, Yorks.—Mr. J. Cooper and Mr. W. S. Pickard have dissolved partnership.

## Private Arrangements.

BRITISH ELECTRICAL REPRODUCTION Co., LTD., Lee Valley Road, Ponders End, Middlesex.—The creditors interested herein met on September 18th at the offices of Mr. F. P. Woodcock, solicitor, 5, Holborn, E.C., when a balance sheet was presented as at September 6th last which showed that the amount due to trade creditors was £2,391, while there were creditors for advances totalling £1,275. There were also debentures and interest of £539 and other items amounting to £135. On the assets side, the cash at bank was put down at £93; there were sundry debtors, £55; stock estimated at £940; furniture and fittings, £44; and patent rights, £597. There was a debit balance on the profit and loss account of £3,128, and preliminary expenses were £35. The authorised capital of the company was £600 in £1 shares, of which £553 had been issued. It was stated that the debit balance referred to included research and experimental expenditure. It was reported that on September 6th last the debenture-holder appointed a receiver and that action was taken in the interests of the general body of creditors, and the debenture-holder intended to defer his claim and was anxious that immediate steps should be taken in order that the company should not go on incurring liabilities. The incorporation took place in July, 1928, when certain patent rights in connection with sound reproducing instruments were taken over from two gentlemen. In May, 1929, arrangements were come to for the company to manufacture radio gramophones for another company. The other company supplied the cash to enable wages to be paid and bought goods for the company. The company's business was to fit radio sets into gramophones which were supplied by the other company. One of the directors had also invented a talking film machine, but it could not be developed owing to lack of funds, and it was stated that if it could be developed and sold the creditors would probably get a substantial dividend. Negotiations were pending. The meeting was adjourned to enable the company to prepare a scheme to submit to the creditors.

## Trade Announcements.

Mr. AUSTIN TARRANT has left Messrs. Griffin, Harding and Bryant, Ltd., electrical engineers, of Park Lane, Swindon, and has commenced business as an electrical and radio engineer at 125, Rodbourne Road, in that town.

Messrs. GABRIEL, WADE & ENGLISH, LTD., state that while they have transferred their wholesale sawnwood business in Hull and West Hartlepool to Richard Wade, Sons & Co., Ltd., they will continue their business in creosoted poles for overhead transmission lines, &c., without any alteration, at Staddlethorpe (Hull) and Ellesmere Port, under the same management.

BRISTOL WIRELESS, LTD., 60, Queen's Road, Bristol, has opened a new branch establishment at 76, Redcliff Street, Bristol.

The JACKSON ELECTRIC STOVE Co., LTD., has opened a branch in Leeds to cover the Northern area at 153, Street Lane, Roundhay (telephone: Roundhay Leeds 62690), and Mr. H. M. Anstey, formerly northern representative, is now branch manager. This arrangement does not interfere with the existing agencies operated by Mr. R. Millett, Manchester, and the North British Engineering Equipment Co., Newcastle-on-Tyne. From October 1st the agency for the company now operated by Mr. K. Hoggan, 68, Needless Alley, New Street, Birmingham (telephone: Midland 5668) will be converted to a branch, and Mr. T. G. Clarson will become branch manager.

Messrs. RD. JOHNSON, CLAPHAM & MORRIS, LTD., of Trafford Park, are making active preparations for the coming season, for all classes of electrical accessories, heating devices, conduits, &c. They are at the present time preparing catalogues for the trade, and they accordingly invite manufacturers to submit their lists covering the lines mentioned above.

In order that the name of the WALSALL HARDWARE MANUFACTURING Co., LTD., may more accurately accord with its products, known as "Walsall" specialities, the name of the company has been changed to WALSALL CONDUITS, LTD.

GASIFIED PULVERISED FUEL (G.P.F.), LTD., Canada House, 4-5, Norfolk Street, W.C.2, informs us that it has acquired the goodwill and business of the Holbeck Engineering Co., previously operated by Fraser & Chalmers Engineering Works, Erith. This alliance, the company states, places it in a strong position to undertake any pulverised fuel business, covering a wide range both in the boiler field and for the metallurgical industry.

As from September 30th the address of the SUPERHEATER Co., LTD., will be Bush House, Aldwych, W.C.2. The telegraphic and cable addresses will remain unaltered, but the telephone number will be Temple Bar 3263.

## Unemployment.

The Ministry of Labour return showed a decrease of 2,560 in the number of registered unemployed during the week ended September 9th, on which date the total was 1,149,700, as compared with 1,152,260 on September 2nd, and 1,299,977 on September 10th, 1928. The number of persons normally in casual employment was 72,900 on September 9th, as against 74,683 on September 2nd, and 74,731 on September 10th, 1928.

## Meter Approved.

The Electricity Commissioners have approved of the construction and pattern of the "British Electric Meters" Type S, single-phase, watthour meter, rated sizes, 2.5, 5, 10 and 20 amps., 200 to 220 and 230 to 250 V, at a frequency of 50 cycles per second.

## British Trade with Brazil.

The Department of Overseas Trade states that Sir Esmond Ovey, K.C.M.G., formerly British Minister in Mexico, who has recently been appointed Ambassador to Brazil, to which post he will shortly be proceeding, would be glad to discuss with British firms and individuals interested in trade with Brazil matters relating to that market. He will be available for interviews during the rest of September. Communications should be addressed to him at 59, Jermyn Street, S.W.1 (Telephone, Gerrard 0244).

## Electricity at an Agricultural Show.

At the Chapel-en-le-Frith Agricultural Society's show held recently, the Trent Valley and High Peak Electricity Co., Ltd., had a large marquee in which an extensive range of domestic appliances were exhibited. The exhibits attracted nearly 3,000

**An Electrical Display at an Agricultural Show.**

visitors, many of whom paid for admission to the show ground solely to see the Electricity Company's tent. Members of the company's staff were assisted by demonstrators connected with the G.E.C., Metro-Vick Supplies, and Kelvinator, Ltd. Some of the exhibits are shown in the accompanying illustration.

## The British Industries Fair, 1930.

Among the developments for the 1930 Fair at Birmingham is an entirely new building, now in course of construction, on the north side of the present 11-acre Fair. This will comprise a dining room specially for exhibitors, another for trade buyers, a large conference hall, and a series of private dining rooms for the use of the numerous trade and professional societies and institutions which have made it their practice for many years to foregather at the Birmingham display. Two spacious passages, each 72 ft. by 40 ft., connecting the new block with the main building, will be arranged and furnished as comfortable lounges for exhibitors and their visitors, the whole occupying over an acre. The plan of re-arrangement now decided upon has the further advantage of solving—for the present, at any rate—the problem of the ever-increasing demands for space made by exhibitors in the Engineering, Gas and General Hardware sections of the Fair. The Electrical Section, whose rapid growth since its inauguration has severely taxed the resources of the management, will share the benefit of the general extension scheme. Negotiations are practically completed for the acquisition of a further 15 acres of land immediately adjoining—an enterprise which will permit of expansions year by year, as circumstances demand, to an aggregate of nearly one-and-a-half times its present immense size. Stand lettings in Birmingham for 1930 already beat all previous records, nearly the whole of the accommodation, including the year's extensions, having been booked six months in advance of the opening date—February 17th. This year an advance catalogue will be issued in December, giving particulars of the principal new or improved products to be displayed.

## Radiovisor Foreign Rights.

The board of Radiovisor Foreign & Colonial, Ltd., announces that it has recently concluded an agreement with the Siemens and Halske A.G., of Berlin, for the exclusive rights of manufacture and sale throughout Europe of all apparatus involving the use of selenium cells. Under this agreement Siemens and Halske undertake to buy Radiovisor cells from the Radiovisor Foreign and Colonial, Ltd., at a fixed price, and to pay a royalty on every apparatus in which the cells are embodied. The period of the agreement is for ten years, and the board deems the terms of the arrangement satisfactory. Negotiations for the formation of an American company have reached an advanced stage, and the managing director is returning to New York at the end of this month.—*Financial Times.*

### The Grocers' Exhibition.

The grocery trade is not one with which the use of electricity is usually associated, but the 33rd International Grocery and Provision Dealers' Exhibition, held during the past week at the Royal Agricultural Hall, gives ample evidence that electricity is gradually taking its place as an important agent in the manufacture of the products of the trade. Practically all the grinding, mixing, and filling machines exhibited were electrically operated, either by electric motors constructed as an integral part of the machine, or by employing belt drive. The following were among those exhibiting electrical apparatus:—Messrs. William Gardner & Sons (Gloucester), Ltd. (sifting, mixing and grinding machinery); Hobart Manufacturing Co., Ltd. (coffee mills and roasters, and meat choppers); Mousdell Machine Co., Ltd. (self-filling and weighing machines); Olland Scales Co., Ltd. (day and night signs); Henry Pooley & Son, Ltd. (tea-cutting, mixing and blending machines); Southall and Smith, Ltd. (foil-wrapping, flour, tea and sugar weighing machines); and Frigidaire, Ltd., Messrs. J. & E. Hall, Ltd., and Kelvinator, Ltd. (refrigerating plant).

### Fire.

The Northants. Electrical Installations, Ltd., Peterborough, announces that, despite the disastrous fire which destroyed its premises and stock recently, it is carrying on business in all departments in Cumbergate, Peterborough. Manufacturers and suppliers are requested to forward duplicate accounts where outstanding, also catalogues, price lists and printed matter, since all existing papers were destroyed.

### Industrial Costs.

During the eighth annual conference of the Institute of Cost and Works Accountants, an open meeting will be held at the Connaught Rooms, Great Queen Street, London, W.C., to-day Friday, September 27th, at 2.30 p.m., to which all managing directors, works managers, cost accountants and others interested are invited. Mr. Alexander Ramsay, chairman of the Engineering and Allied Trades Association for the Birmingham and Wolverhampton districts, who is regarded as an authority on the subject, is to speak on "The Political Factor in Industrial Costs." No tickets of admission are necessary.

### Statistics of Trades and Professions.

Many manufacturers are desirous of ascertaining the number of firms engaged in the various trades and professions of the United Kingdom, and retailers frequently require information as to the number of various residential classes in different counties. Messrs. Smith, Dalby-Welch, Ltd., Gresham House, Old Broad Street, E.C.2, say that they would be pleased to forward a copy of their house organ, which contains a concise list and numbers of practically all trades and professions of the United Kingdom to any of our readers, free of charge, if they mention the name of this journal when applying.

### Lister's Works Extensions.

Messrs. R. A. LISTER & CO., LTD., are extending their Dursley works by the erection of a new foundry and machine shops. This will add about 100,000 sq. ft. of floor area to the works and enable the company to take on a large number of additional men.

### The South American Mission.

The British Economic Mission to South America left Rio de Janeiro last week and arrived at Sao Paulo on September 21st. On the 23rd they were entertained by the British Chamber of Commerce and later were received by the President of the State.

### Canal Haulage in Alsace-Lorraine.

By a regrettable geographical lapse, in our issue of September 6th (p. 393), we ascribed to Germany a new system of electrical haulage which is actually being carried out in Alsace-Lorraine, which is now part of France.

### Book Notices.

"*Journal* of the American Institute of Electrical Engineers," Vol. XLVIII. September, 1929. New York: The Institute. Price $1.

"Problems in Electrical Engineering, with answers." Edited by S. Parker Smith, D.Sc., M.I.E.E. Pp. viii+206. London: Constable & Co., Ltd. Price 6s. net.

"First Year Electrical Engineering." By D. J. Bolton. Pp. xi+260; figs. 118. London: E. Arnold & Co. Price 5s.

### American Insulation Manufacturers' Agreement.

The New York correspondent of *The Times* reports that the three largest companies engaged in manufacturing and selling insulating materials in the United States have formed a sort of cartel with world-wide connections. They are the Johns-Manville Corporation, the Insulite Company, and the United States Gypsum Company. These companies have combined assets of $250,000,000, and affiliation with foreign companies having an additional $75,000,000 worth of properties. The Insulite and Gypsum companies have arranged to pool their distributing facilities throughout the world and the first named will, besides, manufacture Johns-Manville insulating lumber west of the Allegheny mountains. The Gypsum Company has a sales organisation supported by warehouse and mill facilities which stretches all over the United States and over a large part of Canada. All three companies have a large export business and strong banking support. Either directly or indirectly they control a number of paper mills, railways, hydro-electric power plants, lumber properties, chemical plants, and mines.

### The Bihar Mica Bill.

The Calcutta correspondent of *The Times* says that the Bihar Legislative Council has referred the Mica Bill to a Select Committee. The Bill is designed to prevent the stealing of mica; dealers would be required to disclose the sources of their supplies and this has aroused their opposition to the Bill.

The exports of mica are double the quantity accounted for by regular mining, and the surplus is explained by the Government as due to the fact that, as the deposits are scattered widely in the open jungle, large quantities are stolen and sold cheaply to dealers. All the large mining companies have lost money, although the deposits in Bihar are the biggest in the world.

### The Timber Market.

Our Timber Trade Correspondent reports that the arrival of woods for general building construction are of much larger volume than last year from Finland, Russia, and Sweden. Docks are very busy, and, although the consumption is good, it is not sufficient to keep pace with deliveries into the country. Higher freight rates have necessitated an increase in spot prices, but owing to the keen competition in selling values are still comparatively low. Next winter's supplies are likely to be ample. Hardwoods are moving a little more freely; fresh receipts of logs are declining, but of sawn woods more have been coming forward lately, although supplies this year are still much below those of 1928 to date. There is not too much mahogany, cedar, teak, rosewood, and satinwood in the country, and prices for these, especially the better qualities, keep very firm. Stocks of plywood are large, owing to heavy quantities having come forward during the past month, but the consumption is also growing.

### Prices of Materials.

Messrs. F. Smith & Co. report, September 24th:—Copper (electrolytic) bars, £84 15s., 5s. dec.; ditto ditto sheets, no change; ditto ditto wire rods, £94 15s., 5s. dec.; ditto ditto h.c. wire, no change.

Messrs. James & Shakespeare report, September 24th:—No change in copper and lead prices.

Messrs. Edward Till & Co. report, September 24th:—India-rubber, Para fine, 10½d., ½d. dec.

Messrs. James Forster & Co., reporting on September 21st, stated that the lead market has been dull and uninteresting, with minor fluctuations. The recent arrivals having been absorbed by consumers, the contango has once more disappeared and been replaced by a small backwardation, while prompt supplies are again rather short. Demand remained very quiet throughout last week, both in this country and on the Continent, while supplies on the whole are plentiful. The agents of the Producers' Association continue to offer freely, so that at the moment there seems little likelihood of a rise in prices.

# Lighting and Power Notes.

**Aberdeen.**—YEAR'S WORKING.—The report of the City electrical engineer, Mr. J. Alexander Bell, on the working of the electricity undertaking for the year ended July 31st last shows an increase in the total revenue from £229,312 to £248,779. The working expenditure amounted to £104,042, as compared with £105,288 in the preceding year, the gross profit rising from £124,025 to £144,738, to which was added a small amount transferred from rebate to consumers, making a total of £144,781 available. Of this sum £39,221 was allocated to interest on loans, £61,698 to the sinking fund, £2,595 to a proportion of cost of meters transferred from capital account, and £10,000 to writing off machinery. There remained a net surplus of £31,266, as compared with £6,382 in 1927-28. The capital expenditure during the year totalled £87,771, and included £39,314 for machinery, and £36,935 for mains and services. The total now spent on the undertaking stands at £1,530,641. The sales of electrical energy increased from 32,978,002 to 35,484,692 kWh. New consumers connected during the year amounted to 1,969, bringing the total to 13,037. The number of installations carried out under the assisted wiring scheme was the greatest since the scheme was started, and represented 28 per cent. of the total new consumers connected.

**Barnoldswick.**—ELECTRICITY SUPPLY.—The Urban District Council's electricity scheme came into operation on September 20th. There was a brief ceremony at the electricity station in Wellhouse Road, though the official opening ceremony has been deferred until October. The supply is being taken in bulk from Nelson. Application for supplies so far received total 300. The supply to the Earby Council was made available on September 14th.

**Bedford.**—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. R. W. L. Phillips) for the year ended March 31st last record a total revenue of £109,429 and a working expenditure of £56,974, leaving a gross profit of £52,455. To the gross profit was added income from other sources, making a total of £57,803

available and, after deduction of capital and other charges, there remained a net surplus of £3,605. The capital expenditure during the year amounted to £115,139, the principal items of which were £54,174 for machinery and £29,743 for mains. The total now spent on the undertaking stands at £752,763. The electrical energy sold increased from 15,198,879 to 16,807,521 kWh, and the total maximum supply demanded from 6,980 to 7,150 kW.

**Belgian Congo.**—ELECTRICAL DEVELOPMENT.—The Société Coloniale d'Electricité, of Brussels, is now conducting operations at three towns in the Belgian Congo—Leopoldville, Elisabethville, and Likasi. Good progress is being made with the construction and equipment of the power station at Leopoldville. One 600-h.p. Diesel engine and generator running on crude oil has been in operation for some months, and a second has just been completed, while a third is in process of erection. The station will then have a capacity of 2,300 h.p., including the initial producer gas plant. Negotiations are already in progress in respect of power supply concessions to Coquilhatville and Albertville.

**Carnarvon.**—ELECTRICITY SUPPLY.—Concerning the electricity supply to the town, the Council has received a proposal from the National Electric Construction Co., Ltd., for an extension of the agreement for a further period of ten years at the following maximum prices for electrical energy supplied locally:—Lighting, 6d. per kWh; domestic purposes other than lighting, 2d. per kWh; small power consumers, 2¼d. per kWh, with special terms to large consumers. A new feature of the scale of charges is the proposed introduction of a two-part tariff to apply to private residences and shops. Another proposal is that, if any constructional work is necessary, it should be carried out at the actual price for labour and material, plus 12½ per cent. to cover standing charges, &c.

**Canada.**—HYDRO-ELECTRIC CONFERENCE.—The date of the conference between the Federal Government and the Provincial Administrations of Ontario and Quebec to discuss the problems arising out of the hydro-electric developments on the St. Lawrence River is stated to have been fixed for October 2nd. It is hoped that at this conference some agreement may be reached concerning the respective Federal and Provincial rights to water power.

POWER FOR AGRICULTURE.—In the election manifesto of the Ontario Government it is stated that a considerable reduction will be made in the charge for electrical energy supplied to farmers for the average hundred-acre farm. Legislation will also be introduced to enable the Government to grant loans to farmers for the purpose of installing electrical equipment.

**Continental.**—CORSICA.—A body of French engineers is expected shortly to survey the island and decide upon a comprehensive system of rural electrification. The enterprise, estimated to cost about 30,000,0000 francs, is being undertaken by the Union Electrique Rurale, which has been granted a concession to install power stations and lines in the southern part of the island, including nearly all the arrondissements of Ajaccio and Sartène, which, with Bastia, Calvi, and Corte, form five districts containing 62 cantons and 364 communes. These districts are well watered by rivers and torrents, which, although short, bring large volumes of water down from the mountains. A second proposal is to electrify the railway from Bastia to Ajaccio with its branches to Calvi and Ghisonaccia.—*Reuter's Trade Service* (Bastia).

DENMARK.—A Government report on the progress of electricity supply in Denmark during the fiscal year 1926-27 has recently been issued. It shows that while the number of city and town power stations remained at 126, the number of small provincial stations decreased from 353 in 1924-25 to 333. The capacity of the installed plant, however, increased from 176,000 to 263,000 kW.

FRANCE.—In order to meet the growing demand for electrical energy, the capacity of the power station of the Société Havraise d'Energie Electrique at Havre is to be increased by the addition of a 15,000-h.p. turbo-generator. This is expected to be ready for service early in 1931, when the station will have a capacity of 64,240 kW. The power station of the company at Yainville is also being increased to 26,500 kW.

**Douglas (Isle of Man).**—THE PULROSE STATION.—The new generating station at Pulrose, which has been built at a cost of £60,000, is to be opened shortly. It will supply electricity for Douglas in the first instance, and will later be the power station for the whole island, when a scheme for electrifying the whole of the Isle of Man is put into operation.

**Dundee.**—NEW PLANT.—The Corporation Electricity Committee, at a meeting held recently, recommended the erection of a new static sub-station near Fairmuir, as an addition to the Gilburn Road sub-station, and to change over existing supplies in these areas, at an estimated cost of £9,500.

**Exeter.**—BULK SUPPLY.—The terms of the contract for the bulk supply of electricity by the Corporation to the Exe Valley Electricity Co. have now been settled, and the Electricity Commissioners have intimated that they will be prepared to give their formal sanction to the proposed scheme on inspection of the completed agreement.

**Fleetwood.**—YEAR'S WORKING.—A gross profit of £15,574, as compared with £12,319, is reported on the Electricity Department. The net profit was £5,614, as against £3,597. Capital outlay amounted to £14,246, £3,515 being spent in wiring 590 houses under the assisted wiring scheme. The outstanding debt amounted to £83,541. The sale of electricity was 549,049 kWh more than in the previous year. There are now 3,891 electricity users in Fleetwood, an increase of 847.

**Glasgow.**—PROGRESS DURING AUGUST.—Under the Corporation Electricity Department's scheme, 664 houses were wired in August, making the total to date 16,033, while there were 51 applications for the hire of appliances bringing the total up to 18,424.

**Halifax.**—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. F. N. Rendell-Baker) for the year ended March 31st last show a total revenue of £194,766, as compared with £198,378 in the preceding year. Working expenses decreased from £101,192 to £92,302, and there was a gross profit of £102,464 (£97,186). To the gross profit income from other sources was added, making a total of £108,262 available. Interest on loans, contribution to sinking fund, and income tax accounted for £75,678, leaving a net surplus of £32,584, as compared with £27,372 in 1927-28. The capital expenditure during the year amounted to £34,243, the chief item of which was £27,182 for mains and services. The total now spent on the undertaking stands at £878,029. The sales of electricity increased from 28,975,575 to 31,081,590 kWh, and the maximum supply demanded from 16,100 to 17,100 kW. The total income per kWh fell from 1.647d. to 1.504d.

**Horsham.**—AREA EXTENSION.—The Urban District Council has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of electricity supply, so as to include the parishes of Horsham Rural and Warnham in the rural district of Horsham.

**Japan.**—ELECTRICAL DEVELOPMENTS.—Plans are being prepared for the extension of the Ujigawa Electric Company's power station at Kizu-gawa. Three additional 35,000-kW generators will be installed, bringing the capacity of the station up to 165,000 kW. These additions will make the capacity of the Kizu-gawa station greater than that of any other in the country.

The Central Government is being approached with regard to the proposed extension of power plant of the Yamaguchi Prefectural Authorities. The scheme includes the installation of a 45,000-kW generator, and its total cost is estimated at about 8,000,000 yen. It is stated, however, that it is doubtful whether the scheme will be approved by the Central Government.

**London.**—BERMONDSEY.—The Electricity Committee has obtained sanction to the borrowing of £20,000 for mains and services, £2,500 for meters, and £7,500 for installations.

FULHAM.—The Electricity and Lighting Committee has recommended that the Borough Council shall adopt the principle of allowing consumers to purchase the electric wiring and apparatus installed by the Council at their premises, and that the purchase price be fixed at cost, less 5 per cent. depreciation for each year during which the installation has been in use.

BATTERSEA.—The Electricity Committee has received sanction to the borrowing of £30,650 for buildings and £8,970 for plant. Mains extensions are to be carried out at an estimated cost of £3,698.

**Morecambe.**—AREA EXTENSION.—The Corporation Electricity Committee has decided to apply for a Special Order to include within the Corporation's authorised area of electricity supply the parishes of Heaton-with-Oxcliffe, Middleton, and Overton, on the understanding that, in the event of these parishes being included at any time in the borough of Lancaster, no objection shall be raised to their inclusion within the supply area of Lancaster on fair terms of purchase.

**Motherwell.**—YEAR'S WORKING.—The report on the working of the burgh's electricity supply states that the electrical energy sold during the year amounted to 7,676,476 kWh, and that there were 315 new installations. The special charges account included £17,426 paid to the Clyde Valley Electrical Power Co. for electrical energy supplied. The total income amounted to £56,750, and the balance on the revenue account was £14,888.

**Northern Ireland.**—DUNGANNON, Co. TYRONE.—Electrical Supplies, Ltd., Dromore (Co. Down), is to apply to the Electricity Commissioners for a Special Order authorising it to supply electricity in the urban district and in parts of the rural district of Dungannon.

**Oldham.**—TUBULAR HEATING CHARGES.—The Corporation Electricity Committee has decided that the price for electrical energy supplied for electric tube heating systems shall be fixed at ½d. per kWh, provided that such energy is not taken between the hours of 3.30 p.m. and 5.30 p.m.

**Peterborough.**—SALE OF UNDERTAKING.—The *Financial News* reports that at a recent special meeting of the Council it was decided to enter into negotiations with a syndicate, not named, for the sale of the electricity undertaking, on which nearly £800,000 has been expended since its inauguration thirty years ago.

**Portland.**—HIRE-PURCHASE WIRING SCHEME.—At a recent meeting of the Electricity Committee, it was decided that where consumers wish to take advantage of the deferred system of payment for wiring installations they must have a minimum of four points installed. The clerk is to write to the known wiring contractors asking them for their prices for wiring under the assisted wiring scheme according to a schedule.

**Preston.**—YEAR'S WORKING.—The report of Mr. J. F. Simpson, borough electrical engineer, on the working of the electricity undertaking for the year ended March 31st last records a total revenue of £232,367 and a working expenditure of £108,255, leaving a gross profit of £124,112. The figures for the preceding year were: Total income, £207,586; working expenses, £100,499; gross profit, £107,087. To the gross profit was added £676 from the Tramway Committee, £8,716 unemployment grant, and £880 interest on investments, making a total sum of £134,385 available. Interest on loan charges absorbed £113,393, and capital expenditure charged to revenue £2,956, and there was a net surplus of £18,035, as compared with £17,565 in 1927-28. The capital expenditure during the year amounted to £168,678, the chief items being £69,394 for plant and machinery, £19,167 for transmission lines, and £34,847 for mains and services. There was a substantial advance in the electrical energy sold from 38,276,214 to 62,421,057 kWh, an increase of 63 per cent., and the number of consumers connected was 11,603, an increase of 22 per cent. The maximum supply demanded rose from 17,000 to 21,000 kW, and the average price obtained per kWh fell from 1.194d. to 0.927d. The fourth turbo-alternator and two extra boilers were put into operation in December last, and it is hoped that the alterations to existing generators, increasing the capacity of the station from 50,000 to 60,000 kW, will be completed early in 1930.

**Shrewsbury.**—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £10,000 for mains and services.

**Southend.**—ELECTRIC LIGHTING DIFFICULTIES.—At a meeting of the Town Council held last week the Electricity Committee criticised the action of the Electricity Commissioners in postponing the inquiry concerning the installation of additional plant, and recommended the purchase and installation of machinery costing £21,000 without waiting for sanction. If this plant is not installed, many streets in the town will have to remain without lighting during the winter. The recommendation of the Committee was defeated by 23 votes to 9.

**Swansea.**—NEW SUB-STATION AND MAINS.—The Corporation Electricity Committee is to erect a new sub-station at Townhill, and is to lay an e.h.p. main from the existing sub-station to the proposed new sub-station at an estimated cost of £1,650. The Committee has also decided to lay a l.p. main from Pell Street sub-station to Dillwyn Street, at an estimated cost of £1,215.

SUPPLY TO BAKERIES.—The Committee has decided that the charge for the supply of electricity for bakers' ovens shall be at the rate of ½d. per kWh, on condition that such supply is taken during the off-peak period.

**United States.**—ELECTRICAL DEVELOPMENTS.—According to *Power*, facilities which will increase the capacity of the Parr Shoals steam plant of the General Gas and Electric Corporation in South Carolina by 30,000 kW to a total of 72,000 kW have just been completed. The steam station immediately adjoins the Parr Shoals hydro-electric station, making the economic balance of power generation between the two feasible.

**Weymouth.**—NEW CABLES.—The Corporation Electricity Committee has decided to lay new feeder cables at an estimated cost of £2,766.

# Tramway and Railway Notes.

**Blackpool.**—YEAR'S WORKING.—We have received from Mr. C. Furness, general manager of the Corporation Tramways Department, a copy of his report, together with a statement of accounts, of the undertaking for the year ended March 31st last. The total income showed a decrease from £314,329 to £310,770, but the working expenses advanced from £218,560 to £223,333. The gross profit was £87,437, as compared with £95,769 in the preceding year, and to it was added the gross profit (£4,214) from the motor-omnibus account, bank interest, &c., making a total of £92,420 available. Capital charges accounted for £41,623, leaving a net surplus of £50,797, as compared with £68,971 in 1927-28. A contribution of £18,000 was made to the borough fund. The capital expenditure during the year amounted to £32,795, and included £19,484 for cars and other rolling stock and £10,198 for 'buses. The number of passengers carried decreased from 47,239,643 to 47,194,155, but the car-miles run increased from 3,274,741 to 3,476,753. The receipts per car-mile fell from 22.95d. to 21.34d.

**Brighton.**—RENEWAL OF LEASE.—The Town Council has decided to renew the lease of Volk's Electric Railway, which runs along the beach from the Aquarium to Black Rock. Earlier in the year notice was given to Mr. Magnus Volk, founder of the railway and chairman of the company, to terminate his lease on September 30th of the current year, but a petition signed by nearly 5,000 people was sent to the Corporation asking that the lease should be extended. The arrangement, which is subject to the station near the Palace Pier being moved to the east of the proposed promenade extension, is for five years, and compensation will be paid if the agreement is cancelled before the expiry of this period.

**Continental.**—FRANCE.—In the official statistics of the Paris "Metro" published recently, it is stated that the number of passengers carried during 1928 amounted to 818 millions over 103 kilometres of track, which is claimed to be a greater number per kilometre than that of any underground railway of other capitals. In the second quarter of 1929, an increase of 8 million passengers was made over the corresponding period of 1928.

**Glasgow.**—ELECTRIC VEHICLE PROPOSAL.—At the next meeting of the Corporation a proposal is to be made by the Health Committee that, with a view to improving the atmospheric conditions of the city by the elimination of smoke in the use of mechanically-propelled vehicles, all departments of the Corporation shall be instructed to purchase only wagons of a type which are electrically propelled.

**Japan.**—RAILWAY ELECTRIFICATION.—It has been decided to carry out the electrification of the Central and Joyetsu lines early in the fiscal year of 1931-32, and steady progress is being made with the preparatory work. The rolling stock and equipment are to be purchased almost entirely from Japanese manufacturers.

**The Southern Railway.**—SUBURBAN ELECTRIFIED SYSTEM.—The whole of the Southern Railway's suburban electrified system, which was completed in the main last March, is now being run on the third-rail system throughout. This means the final disappearance of the a.c. system of electrification which was begun by the old London, Brighton and South Coast Company twenty years ago. The last stages of the overhead electrification to be completed were those from Victoria to Coulsdon North and Sutton, and these two sections were also the last to be converted to the third-rail system, the change being effected on Sunday last.

**United States.**—NEW YORK SUBWAYS.—In addition to the subway building programme costing £77,600,000, New York City is shortly to begin the construction of another 100 miles of subways involving an expenditure estimated at £87,680,000. This estimate does not include the cost of equipment and the expenses incurred by the purchasing of private property, &c., which will have to be met before the new subways can be brought into operation, and it is likely that the total expenditure on these two schemes will be about £200,000,000.

# Telegraph and Telephone Notes.

**Australia.**—TELEPHONE DEVELOPMENT.—The latest reports of telephone progress in different parts of the world, published in *Telephony*, show that remarkable progress is being made on the Australian continent, where there are now over 500,000 telephones, an increase of no less than 400 per cent. in the past eighteen years, while New Zealand has almost 150,000. In both the Dominions the number of telephones per 1,000 of the population is now higher than in Great Britain, and the rate of progress continues unabated. Long-distance telephony has also made strides "down under." A new 1,000 miles cable, recently completed, links up all parts of the north and south islands which constitute the Dominion of New Zealand, and in Australia a transcontinental land line, nearly 5,000 miles in length, will shortly be in operation between Queensland and Western Australia, giving direct telephone communication between the two capitals, Brisbane and Perth.

**Belgium.**—EXCHANGE FIRE.—Considerable damage to the wiring in the Central telephone exchange at Ghent was caused by a fire which followed a short circuit last week. The service will be disorganised for some days.—*Reuter's* (Brussels).

SWEDISH TELEPHONES AND RAILWAYS.—The Belgian Minister of Communications recently visited Stockholm to study the Swedish systems of telephone and railway communication.—*Reuter's* (Stockholm).

**China.**—AUTOMATIC TELEPHONY.—The contract for the erection at Hankow of new automatic telephone exchanges, commencing with 8,500 instruments, is reported to have been placed with the Siemens & Halske Co., of Berlin.

**Cuba.**—COMMUNICATION SERVICES.—According to a recent return, there are now 12,231 miles of telegraph wires and 65,216 telephone instruments in use in Cuba.

**Fiji Islands.**—RADIO SERVICE.—A new link in Empire communication has been formed by the opening of a high-speed wireless telegraph service between Suva, Fiji, and Sydney, New South Wales. By arrangement between the Colonial Office and the Government of Fiji, Amalgamated Wireless (Australasia), Ltd., in which the Commonwealth Government has a controlling interest, has reorganised the wireless services in the Fiji Islands and has manufactured the equipment in

Sydney, says *The Times*. Amalgamated Wireless (Australasia), Ltd., has now established three large centres in the South-West Pacific at Fiji, New Guinea, and Papua. The Fiji station is in direct touch with three other stations in the Fiji group of islands (Labasa, Savu Savu, and Taviuni), and it maintains communication with Samoa, the Friendly Islands, Gilbert and Ellice Islands, New Caledonia, and the New Hebrides. The Suva station collects and distributes traffic from all wireless equipped stations in the North and South Pacific. Its daily broadcast reports have also proved of great value to shipping and to the islands within its range, especially during the hurricane season.

**International Radio-electric Communication.** — HAGUE MEETING.—The meeting of the International Technical Consultative Committee of Radio-electric Communication at The Hague was inaugurated on September 18th by Mr. Reymer, Dutch Minister of Public Works, those present including Dr. Patya, the burgomaster. Responding to the Minister's words of welcome, General Ferrie, head of the French delegation, expressed thanks for the sympathetic reception accorded the members of the Committee, remarking that Holland was considered now in the whole world as one of the harbours of peace and humanity. The operation of radio-electricity joined in this work of peace, for it was an incomparably effective means of linking up nations and men. Subsequent sittings of the Committee were held in private.—*Reuter's* (The Hague).

**International Telephony.**—AUSTRIA.—The Austrian postal authorities are at present engaged in extending the underground telephone cable between Vienna and Gratz as far as the Jugo-Slavian frontier. A line is also being laid between Linz and Bruck a.d. Mur.

SWITZERLAND.—A new telephone cable has recently been completed between the Swiss town of Brigue and Milan, Italy.

**South America.**—TELEPHONE AGREEMENT.—It is reported that the Swedish L.M. Ericsson Telephone Co.'s Mexican subsidiary has arrived at an agreement with the Bell Telephone Company of America with regard to telephones in South America and Mexico.

**Switzerland.**—LEAGUE OF NATIONS WIRELESS STATION.—The League of Nations sub-committee of the third and fourth committees has unanimously pronounced in favour of the proposal that the League's wireless station shall be worked in normal times by the Swiss Wireless Co. and handed over to the League in times of crisis when a Swiss observer would be present. The Swiss Wireless Co. would undertake to establish alongside the existing station at Pragins, near Geneva, short-wave transmitters for extra-European communication. The League of Nations would pay for the first few years about 200,000 francs (Swiss) annually to cover expenses, which sum, however, would diminish as exploitation increased.—*Reuter's* (Geneva).

**Transoceanic Radio-telephony.**—ANGLO-AUSTRALIAN SERVICE.—Arrangements are being made for the inauguration of a radio-telephone service between England and Australia in the near future Conversations between the two countries are being carried on now with satisfactory results. Direct short-wave transmission will be employed from the Government station at Rugby, the recording station being at Baldock, Hertfordshire.

**The Telephone Service.**—NEW MITCHAM EXCHANGE.—A new automatic telephone exchange at Mitcham, equipped by Siemens Bros. & Co., Ltd., was brought into service on the 11th inst. The exchange opened with 700 subscribers and has equipment for extending to 1,600 with an ultimate capacity for 3,000.

# Radio Notes.

**France.**—NEW STATION.—Work has begun on the new 30-kW station which is situated at Brumath, nine miles from Strasbourg. It is expected to be finished towards the end of November, although it will not be put into full service until early next summer. According to *World-Radio*, the present transmitter of Radio-Paris may be used.

**London Regional Transmitter.** — TESTS.—The B.B.C. announces that, in addition to the present night transmission at the end of the normal programme, the London regional transmitter at Brookman's Park will radiate additional test transmissions on a wave-length of 356.3 metres (842 k.c./s.) from 11.30 a.m. to noon each morning, commencing on September 23rd, Sundays excepted. These tests are intended primarily for the benefit of those who may wish to consult the wireless trade during the course of a test transmission. The tests will be discontinued when the full programme service is transferred from the Oxford Street transmitter to Brookman's Park.

**Poland.**—NEW BROADCASTING SCHEME.—Marconi's Wireless Telegraph Co., Ltd., has been successful in obtaining one of the largest orders of recent years in connection with broadcasting services. It is for a large extension of the Polish broadcasting organisation, which, following the English example, is to be remodelled so as to provide alternative programmes for the greater part of the country. The new equipment will comprise one 120-kW aerial input transmitter with full modulation, two high-power regional stations with 16-kW aerial inputs, and three local relay stations. Provision will be made for simultaneous broadcasting facilities throughout the whole of Poland, the relay stations transmitting on a common wavelength and employing the tuning-fork system of control, such as has been in successful operation in Great Britain. In addition, arrangements will be made for the transmission of Polish programmes to foreign countries. The 120-kW station will be situated near Warsaw and will be used in addition to the 12-kW Marconi station which is already giving excellent service at Warsaw and has been in operation there since 1927. The new high-power station will take the wavelength of the present 12-kW station, which is 1,111 metres; and the 12-kW station will work on a lower wavelength; the two stations will be employed simultaneously for the transmission of alternative programmes. The two new 16-kW stations will be situated at Lemberg and Vilna to provide programmes for the areas outside the range of the lower-powered station at Warsaw. Of the three local relay stations, one will be situated at Lodz, the Polish Manchester, 80 kilometres from Warsaw; the provision of this station is interesting, seeing that it is for the definite purpose of providing an alternative crystal programme for a working-class district. The Marconi Co. has been entrusted with the supply of everything connected with these stations, including all constructional services. Alternative programmes are to be available from Warsaw before the end of this year, and the whole scheme is expected to be in operation before the end of 1930.

**Television.** — EXPERIMENTAL TRANSMISSION. — The experimental radiation by the British Broadcasting Corporation of Baird television outside programme hours began on September 30th. The transmission normally will take place through London (2LO) from 11 to 11.30 a.m. daily, except on Saturdays and Sundays. The object of the demonstrations is to afford the Baird Television Development Co., Ltd., wider opportunity than it has hitherto possessed for developing the possibilities of the system and for extending the scope and improving the quality of reproduction. In granting facilities for experimental demonstrations in which the public can take part neither the Postmaster-General nor the B.B.C. accepts any responsibility for the quality of the transmission, or for the results obtained.

**United States.**—LOUD-SPEAKER PROTEST.—Mr. Robert Ferrari, a New York lawyer, has brought to a head a pressing problem in New York and other crowded American cities by refusing to pay his house rent as a protest against the incessant noise of his neighbours' loud-speakers. When summoned before the Municipal Court of New York, Mr. Ferrari complained that a tenant two floors above him operated a loud-speaker night and day, and made it impossible to sleep, read, or indulge in quiet contemplation. Mr. Farrari declared that the Police Commissioner had taken no notice of his complaint. According to the *Daily Telegraph*, the magistrate reserved his decision on Mr. Ferrari's plea that he should not be forced to pay rent for an apartment that resembled a cabaret more than a home.

BUILT-IN AERIALS.—Contractors who are erecting homes on a new estate on Long Island, New York, are installing built-in aerials for radio sets, doing away entirely with the unsightly aerials on the roofs of homes in the average rural community. A special grade of insulated wire is extended around the cornice of the roof and covered by moulding; a lead-in wire stretches down one corner of the house and enters through a perforation in the exterior wall into the living room. The outlets are in a plug about one foot from the floor; in the same plug is a connection for electric current. No wires are exposed, as they are installed before the walls are finished.

## Microphone Development.

Now that the microphone has made it possible to hear sound amplified, the American Telephone and Telegraph Company and the Bell Telephone Laboratories are working to perfect a new instrument that will be of value in eliminating the devastation of the Mediterranean fruit fly in citrus crops. In its present state the instrument will "broadcast" the sound a larva makes when it feeds during its period of incubation within grapefruit and oranges while awaiting its metamorphosis into a fly. The instrument, however, has not been perfected to detect the sound of the tiny worms as they move about when not feeding. Since there are limits to even a larva's gormandizing, says the *T. and T. Age*, the apparatus will not be entirely practicable until it has been developed further. The idea of listening to citrus fruits to discover before shipment to market whether they are infected with eggs of the fruit fly originated with government entomologists, who for some time have been seeking a way to destroy the pests. They concluded that larvæ with such spiny tentacles must make some noise when eating; tests made recently in Florida showed the theory was sound. Several suspected grapefruit were examined with the instrument, and the expected noises were heard. Other grapefruit, tested similarly, emitted no sound, and were found to be free of larvæ, while the "noisy" ones harboured fledgling flies beneath their healthy-looking skins.

# Contract Information.

**When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.**

## Contracts Open.

**Argentina.**—BUENOS AIRES.—November 4th. Argentine State Railways. Turbo-generator sets and headlights for locomotives. (B.X. 5657.)*

**Australia.** — MELBOURNE. — State Electricity Commission. November 4th. 6,600-V automatic voltage regulators and spares. (B.X. 5637.)* Circuit breakers, operation recorders. (B.X. 5677.)

November 25th. Watt-hour meters, recording instruments, and remote metering equipment. (B.X. 5614.)* Switchgear and accessories for the Yallourn power station. (B.X. 5636.)*

December 16th. Oscillograph equipment. (B.X. 5692).*

Posts and Telegraphs Department. November 12th. Telephone receivers and parts. (B.X. 5656.)* Transmitters and parts. (B.X. 5653.)*

November 19th. Telephone generators and motor generators. (B.X. 5662.)*

October 15th. Telephone jacks. (B.X. 5695.)*

November 19th. Motor-generators. (B.X. 5694.)*

November 26th. Vitreous resistances. (B.X. 5696.)*

SYDNEY.—October 29th. New South Wales Government Railways. Railway traction motor-testing equipment. (B.X. 5693.)*

**Birmingham.**—September 30th. Board of Guardians. Lighting installation at the Witton Hall Institution, Erdington. Mr. N. W. Greenway, Lloyd's Bank Chambers, New Street, Birmingham. Deposit £2 2s.

**Egypt.**—October 16th. Ministry of the Interior. Electric motors, pumps, mechanical filters, &c. (A.X. 8373.)*

October 10th. Supply and erection of a generating station for Tala. (B.X. 5647.)*

**Erith.**—September 30th. Electricity Department. H.p. switchgear, transformers, and sub-station equipment. (September 20th.)

**Glasgow.**—October 8th. Tramways Department. Water-tube boiler plant, one 10,000-kW turbo-alternator with condensing plant and auxiliaries, and e.h.p. switchgear and control gear for Pinkston power station. (September 20th.)

**Grimsby.**—October 4th Electricity Department. Supply of l.p. cables. (September 20th.)

**Halifax.**—October 7th. Waterworks Committee. Electrician's work in connection with the erection of filter house, &c. Particulars from Mr. A. C. Tipple, borough engineer (deposit £2 2s.).

**Hastings.**—October 3rd. Electricity Department. 11-kV metal-clad switchgear and one 5,000-kVA outdoor type transformer. (September 13th.)

**India.**—October 11th. South Indian Railway Co., Ltd., Madras. Electrification of suburban services, overhead contact and distribution lines. (September 13th.)

DELHI.—December 3rd. India Stores Department. Ceiling and table fans. (B.X. 5672.)*

**Kirkcaldy.**—September 30th. District Committee. Electric lighting installation for 30 houses at Thornton and 20 houses at Lumphinnans. Schedules from Mr. Wm. Williamson, F.R.I.B.A., architect, Kirkcaldy (deposit £1 1s.)

**Leeds.**—October 4th. Board of Guardians. Installation of electric lighting at the two children's homes, Roundhay. Mr. J. H. Ford, clerk to the Guardians, 11, South Parade, Leeds.

**London.**—METROPOLITAN ASYLUMS BOARD.—October 2nd. Installation of electric bells at Paddington Casual Ward; new storage battery for T.S. *Exmouth*; alterations to electric lighting installation at Eastern Fever Hospital. (August 30th.)

GREAT WESTERN RAILWAY.—October 8th. Supply from November 1st of telegraph instruments, electrical apparatus (insulators), &c., electric wires and cables, and electric lamps. (September 20th.)

SOUTHWARK.—October 22nd. Borough Council. Electric cables for 12 months. (September 13th.)

CENTRAL ELECTRICITY BOARD.—November 9th. Supply, delivery, and erection of 33,000-V overhead transmission lines in South Lincolnshire. (See this issue.)

**New Zealand.**—WELLINGTON.—Post and Telegraph Department. October 30th. Head telephone receivers. (B.X. 5603.)*

November 12th. Four-conductor operator cords. (B.X. 5685.)*

Corporation.—October 21st. H.p. and l.p. switchgear. (B.X. 5649.)*

December 10th. Public Works Department. Three single-phase oil-insulated water-cooled transformers and accessories. (B.X. 5600.)*

November 12th. 15-kW oil-engine-driven generating set for installation on the "Main Pomare." (B.X. 5683).*

AUCKLAND.—Auckland Electric Power Board. November 4th. L.p. porcelain insulators, ironwork, &c. (B.X. 5648.)*

Distribution pillar shells and link units and cable sealing ends. (B.X. 5682.)*

**Sidmouth.**—October 7th. Supply, delivery, and laying and erection of l.p. paper-insulated feeders and additional overhead l.p. mains. (See this issue.)

**Southend-on-Sea.**—Electricity Department. Supply of 1,500 current limiters. (September 20th.)

Electric Lighting Department. Supply of 2,000 pairs of house service fuse boxes. (See this issue.)

**South Africa.** — JOHANNESBURG. — October 17th. South African Railways and Harbours. One 10-ton electrically-driven overhead travelling crane (A.X. 8463.)*

October 17th. Municipal Council. Supply of tramcar motors. (B.X. 5664.)*

SALISBURY.—October 17th. Municipal Council. H.p. cables, transformers, &c. (B.X. 5604.)*

Turbo-alternators, steam piping, crane and switchgear. (B.X. 5607.)*

CAPE TOWN.—October 16th. Electricity Department. Paper-insulated cables. (B.X. 5640.)*

**Sleaford.**—October 10th. Electricity Department. Supply and erection of one slate control panel with s.p. breaker, switch, &c. (See this issue.)

**Staffordshire.**—October 31st. Education Committee. Installation of electric light in two new elementary schools in course of erection at Brierley Hill. (See this issue.)

**Wakefield.**—October 15th. West Riding Education Committee. Installation of electric light at Thurlstone new schools. Particulars from the Education Officer, County Hall, Wakefield.

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed.

**Croydon.**—Board of Guardians. Accepted:—
Electrical fittings and appliances for six months.—Baxter and Caunter, Ltd.

**Government Contracts.**—The following Government contracts were placed during August, 1929:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.

Accumulators.—London Battery and Cable Co., Ltd.
Battery gear.—Chloride Electrical Storage Co., Ltd.
Turbine blading.—Thos Bolton & Sons, Ltd.
Electric cable.—Anchor Cable Co., Ltd.; Connollys (Blackley), Ltd.; Croydon Cable Works, Ltd.; General Electric Co., Ltd.; Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; Hooper's Telegraph and India Rubber Works, Ltd.; Johnson & Phillips, Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.; St. Helens Cable and Rubber Co., Ltd.
Electric capstan.—Cowans, Sheldon & Co., Ltd.
Electrical installation.—G. E. Taylor & Co.
Table fan spares.—Veritys, Ltd.; General Electric Co., Ltd.
Motor-generators.—Small Electric Motors, Ltd.
Electric lamps.—General Electric Co., Ltd.; Siemens Electric Lamps and Supplies, Ltd
Change-over switches.—McGeoch & Co., Ltd.; Bertram Thomas.
Wireless valves.—General Electric Co., Ltd.; Mullard Radio Valve Co., Ltd.

WAR OFFICE.

Electric cable.—W. T. Glover & Co., Ltd.
Electric lamps.—British Thomson-Houston Co., Ltd.; Stella Lamp Co., Ltd.; General Electric Co., Ltd.

AIR MINISTRY.

Switchboard (Boscombe Down).—Electric Construction Co., Ltd.
Generator controls.—H. W. Sullivan, Ltd.
Floodlights.—Chance Bros. & Co., Ltd.
Generating sets.—Ruston & Hornsby, Ltd.
Motor-generators.—M.L. Magneto Syndicate, Ltd.
Receivers.—C. A. Carter & Co.
W./t. valves.—General Electric Co., Ltd.

POST OFFICE.

Protective apparatus.—Phœnix Telephone and Electric Works, Ltd.
Telegraph apparatus.—Creed & Co., Ltd.
Telephone apparatus.—Automatic Telephone Mfg. Co., Ltd.; Ericsson Telephones, Ltd.; General Electric Co., Ltd.; Phœnix Telephone and Electric Works, Ltd.; Standard Telephones and Cables, Ltd.; Sterling Telephone and Electric Co., Ltd.
Cable.—British Insulated Cables, Ltd.; Connollys (Blackley), Ltd.; General Electric Co,, Ltd.; W. T. Glover & Co., Ltd.; Hackbridge Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Johnson and Phillips, Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones and Cables, Ltd.; Telegraph Construction and Maintenance Co., Ltd.; Union Cable Co., Ltd.
Joint-box castings.—United Steel Companies, Ltd. (Thos. Butlin & Co. branch).
Loading coils.—General Electric Co., Ltd.; Standard Telephones and Cables, Ltd.
Ducts.—Albion Clay Co., Ltd.; Donington Sanitary Pipe and Fire Brick Co., Ltd.; Doulton & Co., Ltd.; H. R. Mansfield, Ltd.; J. Oakes & Co. (Riddings Collieries), Ltd.; Oates & Green, Ltd.; Sutton & Co. (Overseal), Ltd.
Electric lamps.—British Electric Transformer Co., Ltd.; British Thomson-Houston Co., Ltd.; Cryselco, Ltd.; Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.; Metro-Vick Supplies; Siemens Electric Lamps and Supplies, Ltd.; Stella Lamp Co., Ltd.
Solder.—British Insulated Cables, Ltd.; G. W. Neale, Ltd.
Stay swivels.—Bullers, Ltd.
Electric battery trucks.—Greenwood & Batley, Ltd.
Copper wire.—Pirelli-General Cable Works, Ltd.
Flameproof wire.—British Insulated Cables, Ltd.
Batteries (Manchester City telephone exchange).—Pritchett & Gold & E.P.S. Co., Ltd.
Manufacture, supply, drawing-in and jointing cable.—Derby-Loughborough: W. T. Glover & Co., Ltd. Maidenhead-Reading: Callender's Cable and Construction Co., Ltd. Sunderland-Sheraton: British Insulated Cables, Ltd.
Radio equipment (London repeater station).—Standard Telephones and Cables, Ltd.
Telephone exchange equipment.—Loughton: Standard Telephones and Cables, Ltd. Sub-contractors: Crompton Parkinson, Ltd., for ringing machine; Electric Construction Co., Ltd., for charging machines; Hart Accumulator Co., Ltd., for batteries. Cowley (Oxford area), Headington, Castleton (Rochdale area), and Whitworth: Standard Telephones and Cables, Ltd. Palmers Green, Edgbaston, West Bromwich, South (Birmingham), Wednesbury, Grangewood, Albert Dock, Putney: Automatic Telephone Mfg. Co., Ltd. Preston: General Electric Co., Ltd. Sub-contractors: Crompton Parkinson, Ltd., for ringing machines and motor-generator; D.P. Battery Co., Ltd., for batteries. Fulwood (Preston area), Ashton-on-Ribble, and Leyland: General Electric Co., Ltd. Sub-contractors for Ashton-on-Ribble and Leyland: Crompton Parkinson, Ltd., for charging machines; D.P. Battery Co., Ltd., for batteries. Gulliver (Kentish Town): Siemens Bros. & Co., Ltd. Sub-contractors: English Electric Co., Ltd., for charging machines; Crompton Parkinson, Ltd., for ringing machines; Chloride Electrical Storage Co., Ltd., for batteries. Eastbourne: Siemens Bros. and Co., Ltd. Sub-contractors: D.P. Battery Co., Ltd., for batteries.
Telephone repeater station, 4-wire repeater equipment.—Standard Telephones and Cables, Ltd.

CROWN AGENTS FOR THE COLONIES.

Electric capstans.—Cowans, Sheldon & Co., Ltd.
Static transformers.—Brush Electrical Engineering Co., Ltd.
Switchgear.—British Thomson-Houston Co., Ltd.
Telephones.—Ericsson Telephones, Ltd.
Train-lighting equipment.—J. Stone & Co., Ltd.
Wire.—British Insulated Cables, Ltd.; Shropshire Iron Works, Ltd.; Whitecross Co., Ltd.

H.M. OFFICE OF WORKS.

Wiring.—Broadmoor Asylum: Belshaw & Co., Ltd. Imperial College of Science: Electrical Installations, Ltd.
Transformers, &c. (National History Museum).—Metropolitan-Vickers Electrical Co., Ltd.
Motor (National Physical Laboratory).—English Electric Co., Ltd.

**London.**—BATTERSEA.—Electricity Committee. Accepted:—Fixing of two "Bailey" walls to two boilers at the generating station (£2,500).—Babcock & Wilcox, Ltd.

**Leicester.**—Electricity Committee:—
Rotary convertors, transformers, control fear, &c., for the Lero power station (£4,198).—Electric Construction Co., Ltd. Accepted.
Reconstruction of turbine and construction of pipe line at central power station:—

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|---|---|
| OERLIKON, LTD. (Recommended) ... | £15,700 |
| English Electric Co., Ltd. ... ... | 17,082 |

**South Africa.**—CAPE TOWN.—Improvements Committee. Accepted:—
Six electric clocks at Muizenberg Pavilion (£106).—S.A. General Electric Co., Ltd.
Electricity Committee. Recommended:—
4,000 single-phase house-service meters, of Sangamo type.—Hubert Davies & Co.
11,000-V switchgear (£1,632); l.p. switchgear (£4,101).—A. Reyrolle & Co., Ltd.
Cables (£1,117) (manufactured at Netherlands Cable Works).—G. H. Langler & Co.
25 tons .1 stranded h.d. copper wire (£2,584).—British Insulated Cables (S.A.), Ltd.
10 tons .025 stranded h.d. copper wire (£1,034).—Associated Engineers Co., Ltd.
15 miles insulated wire (£345).—Johnson & Phillips, Ltd.
½ ton copper binding wire (£62).—Albert Vaux, Ltd.
3 tons g.i. stay wire (£57).—British Insulated Cables (S.A.), Ltd.
Squirrel-cage motors (£1,354).—F. W. Searle.
Switchgear for new Somerset Hospital and for premises in dock area (£576).—Allen West (S.A.), Ltd.

**Weymouth.**—Electricity Committee. Accepted:—
Cables for the supply of electricity to Preston and Osmington, Overcombe to Preston (£4,251); Preston to Osmington (£1,536).—Johnson & Phillips, Ltd.

# Forthcoming Events.

**National Radio Exhibition.**—September 23rd-October 3rd. Olympia, W.

**Birmingham Electric Club.**—Friday, September 27th. Grand Hotel, Colmore Row, Birmingham, 7 p.m. "Development in Electric Power Control." Mr. C. C. Garrard.

**Institute of Cost and Works Accountants.**—Friday, September 27th. Connaught Rooms, W.C., 2.30 p.m. "The Political Factor in Industrial Costs." Mr. A. Ramsay.

**Batti-Wallahs' Luncheon.**—Tuesday, October 1st. Hotel Cecil, 1 p.m. Mr. G. Balfour, principal guest and speaker.

**Electrical Society of Glasgow.**—Tuesday, October 1st. 30, Gordon Street, Glasgow. 7.30 p.m. "Architectural Lighting." Mr. W. Imrie Smith.

**Exhibition of Inventions.**—October 2nd-12th. Central Hall, Westminster, S.W.

**Diesel Engine Users' Association.**—Friday, October 4th. Caxton Hall, Westminster, S.W., 6 p.m. "Indicating Oil Engines." Mr. G. B. Fox.

**Salford Technical and Engineering Association.**—Saturday, October 5th. Royal Technical Colege, Salford, 7 p.m. "An Automatic Electric Sub-Station." Mr. A. E. Clarke.

**Television Society.**—Thursday, October 1st. Engineers' Club, Coventry Street, London. 8 p.m. Talking films (with demonstrations). Mr. H. S. Ryland.

# The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—

BRITALUX fittings.

BEEDLE electric fans.

PEMBROKE fittings.

Small rectifiers to deliver on the d.c. side 2 amps. at 100 volts continuously. Rotating machines not desired.

# Notes.

## Electric Vans at Mount Pleasant.

It is the contention of those interested in the development of the electric vehicle that for short runs involving frequent stoppages and in congested areas electricity provides the only rival to the horse and avoids many of the disadvantages of the latter. We are informed by Messrs. Wingrove & Rogers, Ltd., that they have recently supplied seven of their standard chassis to the Mount Pleasant Post Office, London, where, we understand, they are in regular use for parcels delivery. These vehicles are designed for a speed of 15 to 18 miles an hour with a contemplated radius of action of 20 to 24 miles on one charge.

**" Victor " Electric Van at Mount Pleasant Post Office, London.**

The batteries are of the D.P. Kathnode type; the voltage has not yet been finally settled, but it will possibly be 66. The van bodies were made to the Postmaster-General's specification. The vans themselves are, however, long past the experimental stage, as a large number are in use in various parts of the country for similar work.

## Faraday House Old Students' Association.

The annual dinner of the Association will be held at the Savoy Hotel on Friday, October 25th, at 6.30 (for 7) o'clock. Dr. A. Russell, F.R.S., president (Principal of Faraday House), will be in the chair.

## Electrical Power Engineers' Association, West Yorkshire Section.

The seventh annual dinner of the Association will be held at the Great Northern Hotel, Wellington Street, Leeds, on Saturday, November 2nd. The reception is at 5.30 p.m., dinner at 6 o'clock.

## Electrified Farms in the United States.

According to the National Electric Light Association there are 6,315,050 farms in the United States, and of these 454,100, or 7.2 per cent., are electrified. The State with the best record is Washington, in which 44.5 per cent. of the farms have electric service. Good development is also recorded for California (42.4 per cent.), New Jersey (40.0 per cent.), and Utah (38.8 per cent.). The State with the largest number of farms —Texas—shows a figure of only 1.6 per cent. This low proportion is common in the mainly agricultural States.

## Electrical Society of Glasgow.

The programme for the 1929-30 session, held at 30, Gordon Street, Glasgow, at 7.30 p.m., is as follows:—

October 1st.—" Architectural Lighting." Mr. W. Imrie Smith.

November 5th.—" Light in Health and Disease." Dr. E. Mudie.

December 5th.—Visit to Royal Technical College (Electrical Engineering Department).

January 7th, 1930.—" The Electric House." Mr. T. Ingram Craig.

February 4th.—" Modern Switchgear: its Weaknesses." Mr. W. McGregor.

March 4th.—Annual general meeting.

## Aluminium-Alloy H.P. Transmission Lines.

In a recent issue of the *Revue de l'Aluminium et de Ses Applications*, M. Andre Pux gives some particulars of the 60,000 V transmission line which has recently been completed between Puisseux and Beauvais, France. The line, which is 35 miles in length, comprises three conductors made of an aluminium alloy known as " Almelec," the sectional area being 155 sq. mm. The conductors are carried on glass insulators at a distance of 7 ft. 3 in. from each other. Owing to the lighter weight of the line and the consequent smaller sag, it has been possible to effect considerable economy by the use of ferro-concrete masts spaced at distance intervals of 207 yd.

## Domestic Electrical Instruction in Ireland.

At the instance of the Irish Free State Electricity Supply Board, instruction in the domestic uses of electricity is to be given to those interested in the subject. Recently an instructress of the Supply Board attended at the Central Technical Insitute in Waterford, and gave a practical demonstration of the comparative costs of gas, coal, and electricity for domestic purposes. It is proposed to form a class at the institute for the instruction of all who wish to learn the benefits of electricity for domestic use, and this instruction will be imparted free to householders in Waterford City and district.

## Oil-Electric Locomotive in Canada.

The success of the oil-burning electric engine built for the Canadian National Railways was proved beyond question by a trial trip on August 26th from Montreal to Toronto. The engine hauled a train of eight cars over a distance of 334 miles in a little over 7 hours, stopping at eleven stations to take on passengers, and the event created great interest among those concerned in transportation problems. Mr. C. S. Brooks, chief of the motive power section of the Canadian National Railways, is the designer of the engine, which is now on display at the Canadian National Exhibition at Toronto.

The locomotive was manufactured by an engineering firm in Glasgow, and weighs 310 tons when fully equipped, with a total overall length of 94 ft., and it should meet present-day requirements in economy, speed, and traction capacity without the enormous initial investment demanded by complete electrification. It carries, approximately, 8,000 lb. of oil fuel, 11,000 lb. of boiler water, 3,000 lb. of engine-cooling water, 3,000 lb. of sand, and 1,000 lb. of engine lubricating oil. The locomotive will handle the heaviest passenger train at high speed.—*Reuter* (Montreal).

## Saving the Seeming Dead.

A *Reuter* message from Sydney states that a device from which, it is claimed, extraordinary results have been obtained in the restoration of those apparently dead was exhibited by a specialist at the Sydney Medical Congress which has just closed. It is based on the principle of stimulating the heart muscle by plunging a needle carrying current into the heart for ten seconds. Its designer reported that in one case, that of a baby, it was possible to revive the child by an application of electricity in this way after the usual methods had proved futile. It is expected that the new treatment will prove of exceptional value in cases of apparent drowning.

## German Power Stations as Fruit and Flower Cultivators.

It is estimated that Germany imports fruit and vegetables of an annual value of over £12,500,000, this being largely due to the fact that the home-grown hot-house productions are unable to compete in price with those imported from countries with more favourable climates. With the object of reducing the imports, efforts have been made in recent years to lower the costs of heating glass houses, and in this connection it is interesting to learn that fruit- and tomato-growing hot houses have for some time formed part of the installations of the Wiesmoor electric power station of the North-West German Power Co. and the Bleicherode plant of the Southern Harz Electricity Distribution Co. The results at these places have been so satisfactory that a series of hot houses for tomatoes, cucumbers, and flowers has lately been established by the Berlin Electricity Supply Co. on land near the Klingenberg super-power station. Altogether an area of about 108,000 sq. ft. have been covered with composite wood, iron, and glass buildings, the latter being provided with hot-water circulation pipes, the water for which is heated by exhaust steam from the turbines. Experiments are also being made at the new installation in connection with the use of electric light and electrically-heated soil for intensive culture.

## Midland Electrical Engineers' Ball.

The Midland Electrical Engineers' ball will again take place in the Grosvenor Rooms of the Grand Hotel, Birmingham, on November 15th. The president is Mr. R. A. Chattock, M.I.E.E., city electrical engineer, Birmingham, and the honorary secretary, Mr. W. Y. Anderson, M.I.E.E., 14, Dale End, Birmingham.

## Appointments Vacant.

Electrical testing assistant for Salford Corporation. Electrical engineer and manager for Loughborough Corporation. Plumber-jointer for Cannock Urban District Council. Deputy borough electrical engineer and manager for Hammersmith Borough Council. Assistant professor in electrical engineering (£600) at the City and Guilds (Engineering) College. Plumber-jointer for Loughborough Corporation. Electrical engineer for Louth Corporation. Meter reader and meter fixer for Cheadle and Gatley Urban District Council. Wireless engineer for the Government of Nigeria. Technical assistant in the engineering section of the inspection branch of the London Fire Brigade. (See our advertisement pages to-day.)

### Educational.

LONDON UNIVERSITY.—The calendar of University College, Faculty of Engineering is now available. First term commences on October 7th and intending students should apply to the Provost at once.

### Electrical Trades Benevolent Institution.

The annual Festival is to be held on November 26th at the Savoy Hotel, when Mr. Howard Marryat, M.I.E.E., M.I.Mech.E., the president, will preside. The dinner will be followed by a dance until 2 a.m.

### The British Association.

CORRECTIONS.—Two errors in our Special Commissioner's report of the meeting of the British Association for the Advancement of Science in South Africa need correction. The only part of the electrified railway line between Sea Point and Simonstown which is being taken up is the 3-mile length between Sea Point and Capetown; the other portion between Capetown and Simonstown is in regular use, and is carrying a very large volume of traffic. Also the president-elect of the Association is Professor Bower, Professor Graham Kerr's colleague in Glasgow University (not Professor Graham Kerr himself).

### Association of Supervising Electrical Engineers.

The provisional programme for the new session so far arranged is as follows:—

October 15th.—Presidential address. Mr. S. B. Donkin.

October 29th.—"Various Applications of Indirect Lighting, with special reference to Public Buildings." Mr. W. J. Jones. (This lecture will be held at the Lighting Service Bureau, Savoy Street, W.C.).

November 16th.—Whist drive, dinner and dance. "Ye Mecca Restaurant," Ludgate Hill.

November 19th.—"Development of Generation and Distribution of Electric Power in the British Isles." Mr. A. Page.

December 17th.—"Synchronisation of Films and Speech." Mr. S. S. Watkins.

January 4th, 1930.—Children's party.

January 21st.—"Recent Developments in Modern Electric Lifts." Mr. L. S. Atkinson.

February 18th.—"H.p. Heating of Water and its Application to Large Buildings." Mr. F. Selley.

February 22nd.—Annual dinner. Hotel Cecil.

March 18th.—"Mercury-arc Rectifiers." Mr. A. M. Manighetti.

April 15th.—"Present-day Practice in Overhead Line Construction." Mr. J. R. Harding.

On Saturday last representatives of the Association of Supervising Electrical Engineers took luncheon with the Exhibition authorities at Olympia. There were also present members of other bodies. Mr. F. W. Bridges (manager) welcomed the guests, and thanks were expressed by Mr. S. B. Donkin (President, A.S.E.E.), Mr. W. A. Tookey (Junior Institution of Engineers), Mr. Ferreira (Society of Model and Experimental Engineers), and Mr. Lambert (Institute of British Foundrymen).

Later, members of the A.S.E.E. inspected the Exhibition, and assembled in the Conference Hall to hear a paper on marine electric propulsion read by Mr. E. M. JOHNSON (Metropolitan-Vickers Electrical Co., Ltd.). In the course of a brief review of the history of the subject, Mr. Johnson said that in 1870 a barge on one of the Russian rivers was driven electrically with power obtained from primary batteries. Real development came during the war, when the United States built and equipped the cruisers *Lexington* and *Saratoga*, which were now employed as aeroplane carriers. On their trials these vessels each developed 200,000 h.p. To-day eight passenger vessels, three fast fruit boats, and a hundred miscellaneous craft were electrically propelled. The author went on to say that there was no general rule by which the economic justification of electric drive could be determined. Each case had to be considered separately. Dealing with the methods adopted, Mr. Johnson said that a.c. turbo-electric equipment was cheaper and lighter where a machine was installed for each screw. Diesel-electric drives usually employed a.c., especially where there was a large auxiliary load. The principal advantages of the turbo-electric system over geared turbine propulsion were reduced maintenance, greater reliability, flexibility of control (especially in the matter of reversing), the independence of the driving motors from the turbo-generators, and reduced racing when the propeller left the water. In a turbo-electric system the turbines could be started up before the vessel moved, which effected a considerable saving of time. The Diesel-electric drive gave even better operating conditions. In addition to the advantages of the turbo-electric arrangement, there was the economy in machinery space effected; the engine and propeller speeds were independent; a larger number of smaller engines could be installed, so that the parts were more easily handled; and reliability was increased, as the shutting down of one engine did not seriously affect the speed of the vessel. Moreover, it was possible to control the vessel directly from the bridge, thus avoiding the delay and possible error involved in the transmission of orders to the engine room. Mr. Johnson then described typical systems, and mentioned a number of general principles on which installations were carried out. He pointed out that the Diesel-electric drive was eminently suitable for tugs, ferries, river boats, and double-service boats, such as fire-boats, dredgers, &c.

Mr. DONKIN, who occupied the chair, thanked Mr. Johnson for his paper, his thanks being seconded by Mr. A. H. DYKES. During the discussion, in which Messrs. A. Kirk, B. C. Garman, L. W. Metcalf, H. Clarke and H. West participated, the author very ably dealt with a number of questions on various aspects of his subject.

### Legal.

A CONSUMER AND HIS METER.—In the Mayor's and City of London Court, last week, before Mr. Registrar Dell, the County of London Electric Supply Co., Ltd., sued E. M. Catchpole, Balham, for £1 15s. The plaintiffs' representative said that the electrical installation and wiring of the house was done by the company, which had put in a slot meter. The house was bought by Mr. Catchpole, who wanted a quarterly meter installed in the place of the slot meter. An agreement to pay the charges necessitated by the change was signed by E. M. Catchpole. Mr. Catchpole, who appeared in answer to the summons, said that the initials upon the summons were those of his wife, but the Registrar said that he was prepared to amend the summons.

Mr. Catchpole thought that the charge made by the plaintiffs was excessive. He had been informed by the previous tenant of the house that the installation had been paid for, and the work of changing over the meters took about a quarter of an hour. He was prepared to pay for a quarter of an hour's time.

The Registrar said that Mrs. Catchpole had signed an agreement to pay the company's charges of 35s. for changing over from a slot meter to a quarterly meter, and entered judgment for the plaintiffs for the amount claimed to be paid at the rate of 5s. per month.

CASE AGAINST DERBYSHIRE AND NOTTS. POWER CO. DISMISSED.—We reported in our last issue (p. 507) that a summons against the Derbyshire and Notts. Electric Power Co. for an alleged contravention of the Factory Acts had been adjourned. The allegation was that the company had neglected to insulate an electric conductor whereby a man was injured and subsequently died. When the case was resumed on September 17th an engineer with the contractors who were carrying out work at the Spondon station, Messrs. Balfour, Beatty & Co., said that they could not have proceeded with the work without removing the screen which protected the conductor in question. Another witness said that the work had been completed when the accident occurred. He was of the opinion that the deceased man punctured the insulation of the conductor with a brush which he was using.

A power station superintendent of the defendant company considered that the regulations regarding protection had been complied with. Mr. H. W. SWAIN, Electrical Inspector, admitted that there would have to be an interval between the removal of a temporary screen and the fixing of the permanent one.

Sir HENRY MADDOCKS, K.C., who defended, submitted that the company had no case to answer. The magistrates concurred in this view and dismissed the summons, stating that in their opinion the conductor was properly insulated and reasonably protected. Mr. SAYWELL, prosecutor, asked them to state a case for the Divisional Court, but the Clerk pointed out that the decision was taken on facts and not on a point of law.

## Institution Notes.

### Institution of Electrical Engineers.

The 1929-30 session will open on October 24th, when the President, Colonel Sir T. F. Purves, O.B.E., will deliver his inaugural address. The annual dinner will take place on Thursday, February 6th, 1930.

### Junior Institution of Engineers.

Sir Ernest William Moir, Bt., M.Inst.C.E., has accepted the invitation of the Council to become president of the Institution in succession to Lt.-Col. J. T. C. Moore-Brabazon, and his induction will take place at a meeting to be held at the Royal Society of Arts on December 13th, when he will deliver an address. The winter session of the Institution opens on October 4th, and thereafter meetings will be held weekly. On October 25th a paper will be read on "Electric Welding as applied to bridges and other structures on the L.N.E. Railway, with data as to strength and cost," by Harold Bruff. A visit is to be paid to the Brimsdown power station of the North Metropolitan Electric Power Supply Co.

### The Faraday Society.

A general discussion on the molecular spectra and structure took place at the Bristol University on September 24th and 25th, when some 35 introductory and special papers were submitted for consideration.

### Institute of Transport.

The first ordinary meeting of the 1929-30 session will take place on October 14th at the Institution of Electrical Engineers, Victoria Embankment, at 5.30 p.m., when Sir Josiah C. Stamp will be inducted as President, and will deliver his inaugural address.

# Our Personal Column.

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.**

On September 19th, Mr. H. E. YERBURY, the deputy general manager of the Sheffield Corporation Electric Supply Department, who has taken up a position with the Graham Amplion Co., was presented by Mr. E. Morgan, the general manager, on behalf of the staff, with a solid mahogany secretaire chest. On the following day the Lord Mayor presented him with a resolution of the Electric Supply Committee under the seal of the Corporation expressing regret at his departure, and placing on record its appreciation of his services to the Tramways and the Electric Supply Departments during the past 29 years.

*The Industrial Australian and Mining Standard* states that the Perth City Council has appointed Mr. F. C. EDMONDSON, its electrical engineer, to the position of general manager of the Electricity and Gas Department, at a salary of £1,200 a year, in succession to the late Mr. C. E. Crocker. There were about 40 applicants for the position. The same contemporary adds that Mr. HENRY W. ALLEN, general manager of Imperial and International Communications, Ltd., London, is at present in Sydney, just completing a stay of six weeks in Australia.

The Worcester City Council has appointed Mr. B. M. COOPER, of Blackburn, as chief assistant engineer of its Electricity Department, at a salary of £559 per annum.

Congratulations to Mr. MAGNUS VOLK upon the grant by the Brighton Town Council of a further five years from next month, subject to other works, to run Volk's electric railway on the eastern beach. If change has to be made during that period compensation will be awarded.

Mr. H. H. LANCASTER, traffic superintendent to the Blackpool Corporation, last week received a presentation from the members of the Blackpool branch of the National Association of Local Government Officers, on the eve of his departure to take up a similar position at Leeds. Mr. C. Furness, general manager of the Tramways and Electricity Undertaking, who made the presentation, described Mr. Lancaster as a man fearless in his opinion, quick in his decisions, and courteous and tactful in his dealings with others.

The Southend-on-Sea Town Council has increased the salary of Mr. R. G. Foss, shift engineer at the electricity works, from £266 to £299 per annum, subject to the approval of the Wages Committee.

Mr. P. F. MANN, of Messrs. P. F. Mann, Ltd., engineers' merchant specialists, of 212, Madras Street, Christchurch, New Zealand, is at present on a business visit to this country. His address for the next few weeks is Hotel Strathcona, 25, Lancaster Gate, W.

Mr. A. E. JEPSON, who is relinquishing the position of manager of the Sheffield branch of the General Electric Co., Ltd., to join the company's Manchester branch, has been appointed assistant manager of that branch and not "deputy assistant manager" as stated by a Sheffield paper which we quoted in our issue of September 6th.

Mr. A. E. VICKERY, foreman of the electrical branch at Devonport Dockyard, has been appointed acting assistant electrical engineer in the department of the Director of Electrical Engineering at the Admiralty.

Islington Borough Council Electricity Committee has appointed Mr. F. W. J. CORBETT, of Wembley Hill, relief charge engineer, at a salary of £298 per annum.

Messrs. W. W. COOK & PARTNERS are dissolving partnership on September 30th, and giving up their practice as consulting engineers. Mr. Cook, who has been in the telephone business for over 45 years, is retiring, and Mr. Pook has accepted an appointment with the International Telephone and Telegraph Corporation, of Connaught House, Aldwych.

Alderman C. W. SHIPLEY, chairman of the York Electricity Committee, has accepted an invitation to become Lord Mayor of the city for the ensuing year.

Fulham Borough Council Electricity and Lighting Committee recommends that Mr. H. CLARKE, engineering assistant at the electricity works, be designated "constructional engineer," and that his salary be increased to £475 per annum. Mr. E. W. C. DAY, of North Finchley, has been appointed mains assistant in the electricity department at a salary of £306 per annum

Last week Mr. F. W. PURSE, who is leaving West Ham to take up the position of chief engineer to the London and Home Counties Joint Electricity Authority, received two presentations. The first was made by the West Ham Rotary Club, of which Mr. Purse is a founder-member and past-president. It took the form of an inscribed silver cigarette box. The second presentation was an expression of appreciation from the West Ham Electric Power Users' Association, on an illuminated parchment signed by the committee of the Association. With it Mr. Purse received an engraved silver plate. In expressing his thanks, Mr. Purse emphasised the fact that he was going to serve an authority whose aim was to provide cheap electricity.

An announcement appears in the Press to the effect that Mr. C. J. FOX, managing director of the Stanton Ironworks, has joined the board of Crompton Parkinson, Ltd.

We understand from the newspaper Press that Mr. ROBERT BIRKETT, who has been for 24 years borough electrical engineer of Southend, has retired.

**Obituary.**—ALDERMAN J. PYBUS.—We record with regret the death at the age of 84 years of Alderman John Pybus, of Hull, father of Mr. P. J. Pybus, C.B.E.

MR. R. A. YOUNG.—*The South African Engineer* reports the somewhat sudden death, at Bulawayo on August 19th, of Mr. R. A. Young, town electrical engineer of that town.

MR. G. PAYNE.—The funeral took place at Brighton last week of Mr. George Payne, head of the accounts department of the Brighton Corporation electricity undertaking. Many representatives of the various Corporation departments were present at the ceremony.

R. BRAIDFORD.—The death occurred on September 17th of Mr. R. Braidford, electrical and mining engineer, of Brampton, Chesterfield. He was 59 years of age.

Mr. J. E. WATKINSON.—The death took place on September 12th, at the age of 31 years, at Brigg, Lincs., of Mr. Joseph Edward Watkinson, who had been electrical inspector at Cardiff for the National Boiler Insurance Co., Ltd. He was formerly electrician at Bolsover Colliery, Derbyshire.

**Will.**—Sir SYDNEY H. COOPER HUTCHINSON, late Director-General of Telegraphs in India, who died in June last, left unsettled estate of £2,745 gross revenue, and £2,562 net personalty.

# Financial Section.

**New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.**

## New Companies Registered.

**Signs and Products, Ltd.**—Private company. Registered September 19th. Capital, £500 in £1 shares. Objects:—To carry on the business of advertising contractors or agents, manufacturers of, and dealers in illuminated and other signs, electricians, mechanical engineers, &c. The first directors are:—A. F. Hooke, 10, Wilbraham Place, S.W.1, director (chairman); E. S. Morris, The Stores, Reddicap Hill, Sutton Coldfield, manufacturers' agent; G. J. Finnigan, 77, The Mall, Southgate, N.14, business organiser (managing director). Registered office: 45, Bedford Row, W.C.1.

**Bandolux, Ltd.**—Private company. Registered September 19th. Capital, £5,000 in 3,000 10 per cent. non-cumulative participating preferred ordinary shares of £1 each and 40,000 deferred ordinary shares of 1s. each. Objects:—To adopt an agreement with Alois Geisen to manufacture and exploit the travelling sign known as "Bandolux," to carry on the business of advertising agents and contractors by signs or by any other means, electricians, mechanical engineers, manufacturers and workers of, and dealers in electricity, &c. The subscribers (each with one deferred ordinary share) are:—E. C. Claydon and H. Booth, 13a, Old Burlington Street, W.1, clerks. The

first directors are to be appointed by the subscribers. Solicitors: Woolfe & Woolfe, 13a, Old Burlington Street, W.1.

**Concerton Radio and Electrical Co., Ltd.**—Private company. Registered September 18th. Capital, £5,000 in £1 shares. Objects:—To carry on business as indicated by the title. The directors are:—L. Petit, 16, Rue du Zodiac, Brussels, Belgium; E. Asseo (managing director), 5, Granville Mansions, Shepherd's Bush, W. The said L. Petit shall be permanent governing director so long as he holds 1,000 shares. Secretary: H. Tracey. Registered office: 41, Bedford Square, W.C.1.

**A. & E. Durn & Co., Ltd.**—Private company. Registered September 16th. Capital, £1,000 in £1 shares. Objects:—To carry on the business of electrical and general engineers, manufacturers of, and dealers in wireless, gramophone, electrical and general sundries, &c. The subscribers (each with one share) are:—A. J. Durn, 432, Mawneys Road, Romford, electrical engineer; P. F. Riley, 103, Grange Road, Ilford, clerk. A. J. Durn is to be permanent managing director and chairman.

**A. Dean & Co. (Norbury), Ltd.**—Private company. Registered September 16th. Capital, £1,000 in £1 shares. Objects:—To carry on the business of electricians, electrical and mechanical engineers, &c. The directors are:—A. Dean, 12, Pollard's Hill North, Norbury (director of A. Dean & Co., Ltd.); G. J. Wright and Catherine E. Wright, 2, Waldegrave Park, Strawberry Hill, Middlesex. Registered office: 9, Coleman Street, E.C.2.

**West London Electro-Medical Manufacturing Co., Ltd.**—Private company. Registered September 14th. Capital, £100 in £1 shares. Objects:—To acquire any patents or licences in connection with the use of electro-medical or other electrical apparatus, &c. The subscribers (each with one share) are:—W. C. Flynn and F. Hopton, 2, Bond Court, Walbrook, E.C.4, clerks. The first directors are to be appointed by the subscribers. Solicitors: Linklaters & Paines, 2, Bond Court, Walbrook, E.C.4.

**Associated Wireless Co., Ltd.**—Private company. Registered September 14th. Capital, £500 in £1 shares. Objects: To carry on the business of wholesale and retail wireless instrument makers, electrical engineers and contractors, &c. The subscribers (each with one share) are:—R. E. Castell, 47, Wargrave Avenue, South Tottenham, N.15, clerk; B. F. Cope, 17, Lancaster Street, Blackfriars, S.E.1, clerk. Solicitors: C. Butcher & Simon Burns, 32, Gresham Street, E.C.

**Rowmal Radio and Trading Co., Ltd.**—Private company. Registered September 14th. Capital, £2,000 in £1 shares. Objects:—To carry on the business of manufacturers of, and dealers in wireless receiving sets, component parts and accessories, gramophones, &c. The permanent directors are T. A. Rowley, 21, Botterville Road, Acocks Green, Birmingham; S. M. Kirk, "The Grange," Shirley, Warwick. Registered office: 36, Cannon Street, Birmingham.

# Official Returns of Electrical Companies.

**Electrix, Ltd.**—J. J. Ure, 11a, Hart Street, W.C., ceased to act as receiver or manager on August 27th, 1929.

**Wright (Electric Power Specialities), Ltd.**—Mortgage on freehold premises known as Century Works, Pellen Lane, Halifax, with plant and machinery, &c., dated August 31st, 1929, to secure all moneys due or to become due from the company to Martin's Bank, Ltd.

**Yeovil Electric Light and Power Co., Ltd.**—Capital, £75,000 in £1 shares. Return dated May 27th, 1929. 65,000 shares taken up. £65,000 paid. Mortgages and charges, nil.

**Carlisle and District Transport Co., Ltd.** (formerly City of Carlisle Electric Tramways Co., Ltd.).—Capital, £60,000 in £1 shares. Return dated May 28th, 1929. All shares taken up. £60,000 paid. Mortgages and charges, £40,000.

**Liverpool Electric Cable Co., Ltd.**—Capital, £200,000 in £1 shares. Return dated May 21st, 1929. 150,000 shares taken up. £127,833 paid. £22,167 considered as paid. Mortgages and charges, £7,917 7s. 1d.

**Wolverhampton District Electric Tramways, Ltd.**—Capital, £200,000 in £5 shares. Return dated May 14th, 1929. 32,200 shares taken up. £159,812 10s. paid (being £5 per share on 31,950 and 5s. per share on 250 shares). Mortgages and charges, £26,000.

**Collier & Illingworth, Ltd.**—Capital, £1,000 in £1 shares. Return dated February 25th (filed May 23rd), 1929. 400 shares taken up. £400 paid. Mortgages and charges, nil.

**Northern Electric Lamp and Accessories, Ltd.**—Capital, £1,000 in £1 shares. Return dated September 28th, 1928 (filed May 6th, 1929). 415 shares taken up. £15 paid. £400 considered as paid. Mortgages and charges, nil.

**Wadebridge and District Electric Supply Co., Ltd.**—Capital, £3,450 in 1,250 preference and 2,200 ordinary shares of £1 each. Return dated April 8th, 1929. All shares taken up. £460 paid on 360 preference and 100 ordinary shares. £2,990 considered as paid on 890 preference and 2,100 ordinary shares. Mortgages and charges at date of return, £850 (£350 since paid off).

**Oco Electrical Appliances, Ltd.**—C. D. Britten, 16, John Dalton Street, Manchester, ceased to act as receiver on September 5th, 1929.

**Bailey & Incledon, Ltd.**—E. V. Weller, 17, Soho Square, W., was appointed receiver and manager on September 14th, 1929, under powers contained in debenture dated November 21st, 1928.

**Electric Supply Corporation, Ltd.**—Capital, £500,000 in 250,000 preference and 250,000 ordinary shares of £1 each. Return dated July 1st, 1929. All shares taken up. £479,000 paid on 250,000 preference and 229,000 ordinary shares. £21,000 considered as paid on 21,000 ordinary shares. Mortgages and charges, nil.

**J. B. Saunders (1923), Ltd.**—Capital, £5,000 in 1,000 preference and 4,000 ordinary shares of £1 each. Return dated May 14th, 1929. 795 preference and 4,000 ordinary shares taken up. £4,795 paid. Mortgages and charges, nil.

**Anglo-American Telegraph Co., Ltd.**—Capital stock: £7,000,000 in 269,080 ordinary stock, £3,365,460 preferred ordinary stock, and £3,365,460 deferred ordinary stock. Return dated May 28th, 1929. All stock taken up. £600,000 paid. £6,400,000 considered as paid. Mortgages and charges, nil.

**Anglo-Portuguese Telephone Co., Ltd.**—Capital, £1,100,000 in 1,000,000 ordinary and 100,000 "A" ordinary shares of £1 each. Return dated May 13th, 1929. 465,060 ordinary and 100,000 "A" ordinary shares taken up. £301,046 paid. £264,014 considered as paid. Mortgages and charges, £148,140. Return of allotments, made up to June 25th, 1929, shows a further 144,962 shares allotted (118,012 issued for cash and fully called up and 26,950 issued as fully paid, as consideration for the surrender of an equivalent amount of 7 per cent. first mortgage convertible debenture stock).

**C. J. Ferguson & Sons, Ltd.**—Capital, £5,000 in 2,500 preference and 2,500 ordinary shares of £1 each. Return dated June 14th, 1929. 2,500 preference and 1,802 ordinary shares taken up. £2,802 paid on 1,000 preference and 1,802 ordinary shares. £1,500 considered as paid on 1,500 preference shares. Mortgages and charges, nil.

**Babcock & Wilcox, Ltd.**—Capital, £4,620,000 in 100,000 6 per cent. preference, 200,000 5 per cent. second preference, and 4,320,000 ordinary shares of £1 each. Return dated May 7th, 1929. 100,000 preference, 179,056 second preference, and 4,299,656 ordinary shares taken up. £1,029,884 paid on 179,056 second preference and 850,828 ordinary shares. £3,548,828 considered as paid on 100,000 preference and 3,448,828 ordinary shares. Mortgages and charges, nil.

# City Notes.

### Crompton Parkinson, Ltd.

The annual meeting of this company was held on September 19th, Mr. F. Parkinson (chairman) presiding. In presenting the report and accounts (ELEC. REV., September 13th, p. 449), the chairman said that in the trading period under review they had achieved three records:—The total sales of the company's products had exceeded those of any previous period; the net trading profit was the highest ever recorded; and the unexecuted order book at the close of the financial year was the largest they had ever had. In order to maintain the manufacturing plant at the highest possible standard of efficiency the directors were pursuing the policy of installing the most up-to-date automatic machine tools and other equipment, and had decided to increase the amount written off as depreciation to cover the plant superseded as a result of this policy. A complete review of the world's markets for electrical machinery showed that in certain directions the redesigning of certain lines and the introduction of new lines of manufacture were necessary. This work had been actively pursued during the past year, with the result that the company's products to-day represented the highest standard of manufacture in their respective lines. The policy of consolidating the company's sales organisation throughout the world, and of extending it into every part of the globe, wherever a profitable market offered, was continued. The branch works in Australia continued to be fully employed and were being enlarged. In order to install new plant to meet the increased demand for the company's products, it was proposed to create 200,000 ordinary shares, nominal value 5s. each, which would be offered to existing ordinary shareholders at 10s. each in the ratio of one new share for every two shares held. The report and accounts were adopted and at an extraordinary meeting subsequently held the creation of the additional ordinary share capital was unanimously approved.

### American and Foreign Power Co.

A dividend of $1.75 on the second preferred "A" stock has been declared for the period October-December, 1928, in addition to the regular quarterly dividend on the $7 and $6 preferred stocks. Since its formation in 1923 this company, which is controlled by the Electric Bond & Share Co., has rapidly expanded. At the end of last year its investments stood at $285,565,000 (£57,113,000), as compared with $48,865,000 (£9,773,000) at the time of its organisation. During this period it has acquired the widespread Pearson interests in South America, large public utility systems in Argentina, Northern Mexico, Brazil, and Central America, and, more recently, the important power and light system of the International Settlement in Shanghai, at a cost of $50,000,000 (£10,000,000).

### Quebec Power Co.

The *Financial News* says that cabled advice has been received stating that the directors have authorised the issue of shares of no par value at $50 per share to shareholders of record on October 15th, 1929. The basis of the right to subscribe is at $50 Montreal funds for one share in respect of every ten shares then held.

A dividend has been declared on the common shares of $\frac{3}{4}$ per share for the quarter ending September 30th, 1929, payable October 15th, 1929, to shareholders of record on September 27th.

### Official Notice *re* Companies.

The names of the undermentioned companies will be struck off the register at the end of three months unless cause is shown to the contrary:—

F. C. Brown (Electricity), Ltd.
General Battery Co., Ltd.
Midland Radio Telephone Manufacturers, Ltd.
N.S. Battery and Equipment Co., Ltd.
Win-sum Electric Diffusers, Ltd.
Skipton Electrical Co., Ltd.
Wireless Distributing Co., Ltd.

### Hydro-Electric Securities Corporation.

It is announced that the Corporation, in association with important American banking and public utility concerns, has formed the "United States Power Corporation" with a capital of 1,000,000 preferred shares, 2,000,000 "A" shares, and 20,000,000 common shares, all of no par value. The concern is said to have assets valued at over $92,000,000. It will acquire, finance, and manage electric power and other public utility undertakings. The Hydro-Electric Securities Corporation has subscribed $15,100,000 in shares and cash.

### Stock Exchange Notices.

The undermentioned have been ordered to be officially quoted:—

Cables and Wireless.—£344,915 7½ per cent. non-cumulative "A" ordinary stock; £198,083 "B" ordinary stock; and £275,892 5½ per cent. cumulative preference stock.

Underground Electric Railways of London.—2,761 ordinary shares of £1 each, fully paid, Nos. 7,219,686 to 7,222,446.

### Direct Spanish Telegraph Co. Ltd.

The board has decided to pay, in addition to the dividend for the half-year to June 30th, at the rate of 10 per cent. per annum on the preference shares, an interim dividend of 4 per cent., free of tax, on the ordinary shares, both payable on October 1st.

### Bruce Peebles & Co., Ltd.

A dividend of 3¾ per cent. has been declared on the 7½ per cent. cumulative participating preference shares for the half-year ended June 30th.

### Parker, Winder & Achurch, Ltd.

A dividend at the rate of 5 per cent. per annum has been declared on the ordinary shares for the half-year ended June 30th.

### Montreal Light, Heat and Power Consolidated.

A dividend of $0.60 per share has been declared on the common shares for the quarter ending September 30th.

### Liverpool Electric Cable Co., Ltd.

The capital of this company has been increased from £200,000 to £300,000.

### British Aluminium Co., Ltd.

The directors have declared an interim ordinary dividend of 4 per cent. actual (as last year).

### Swiss Company.

The *Motor-Columbus Company for Electrical Undertakings*, Baden, proposes to pay 10 per cent. for 1928-29 on share capital of 75,000,000 fr., as in the previous year. The recent 5 per cent. loan of 20,000,000 fr., issued for the redemption of old loans, is reported to have been largely over-subscribed.

### Electric Supply Corporation, Ltd.

The interim ordinary dividend is again at the rate of 8 per cent. per annum.

### Folkestone Electricity Supply Co., Ltd.

A dividend at the rate of 8 per cent. per annum, free of tax, has been declared on the ordinary shares for the past half-year.

# Stocks and Shares.

TUESDAY EVENING.

THE Stock Exchange markets have endured a sharp shock to prices, and to public confidence, by the occurrences which have arisen in connection with what is called "the Hatry group" of companies. On the Settlement Day—Thursday in this week—it will become apparent more clearly than is the case now how far the ramifications of the trouble are likely to extend. At first, the tendency was to make the worst of them, but after the week-end a good deal of money came into the Stock Exchange, evidently seeking for bargains that might be available as a direct consequence of the slump in the Hatry shares. Electricity supply descriptions weakened from the best, though there was nothing in the nature of a slump. The American Hydro-Electrics wavered and went back, though the decline was promptly recovered. Industrial shares are dull, though electrical equipment shares show further firmness. There is still a lurking fear lest it may become necessary to advance the Bank Rate to 6 or 6½ per cent., and certain labour difficulties threaten to become more vocal than holders of shares in the companies likely to be concerned by such demands are altogether pleased to estimate.

### Slump Effects.

The actual companies covered by the Stock Exchange Committee's withdrawal of permission to deal in their shares are none of them connected with electricity, except very indirectly. It may be that some of the foreign companies interested in the sale of machines, &c., to Photomaton, will feel the effect of the present position. A statment issued by Siemens & Halske declared that the company was in no way concerned with the affairs of the London Photomaton Company, but merely sold machines to the Paris undertaking that controls the Photomaton interests in Germany. The other companies stand well outside the pale of electrical interests. It is possible, of course, that the Trust Companies included in the group may have effected purchases of shares in electrical companies, and that this, if it should be the case, will lead to sales upon an unwilling market. This, however, is pure hypothesis, and no indication has appeared so far of liquidation being in force in connection with the shares in any electricity supply or equivalent undertaking.

### Cables and Wireless.

The market for gilt-edged stocks has been shaken, though prices stood up remarkably well to the shock occasioned by the crisis. Such issues as the 4 per cent. debenture stock of the Central Electricity Board, and the 5 per cent. debenture stock of the London Power Corporation, have scarcely moved, although, as they had been dull previously, it might be assumed that they were in any case hardly likely to go back to any material extent. Central Electricity 4 per cent. debenture can be bought at 78½, and London Power 5 per cent. debenture at 97½, these paying £5 2s. and £5 3s. per cent., respectively, on the money. Both are, of course, first-rate securities, gilt-edged in their particular class. The 5 per cent. preference stock of Cables & Wireless, Ltd., fell back to 94½, showing a fall of 1, but the company's "B" stock underwent a severe shrinkage, going down 7½ points to 62½ upon pressure to sell stock to an unwilling market. It would appear to be obvious that a good many of the people who bought this stock when it was issued in July last, did so on the assumption that they would be able to get out by selling it at a good profit to American purchasers. The latter, however, did not materialise, and under the wearying influence of incessant weakness, the speculative holders of the stock have turned it out in something that approaches disgust.

### The Dollar Stocks.

American Stock Exchanges did not seem at first to know how to take the slump that followed upon the Hatry exposures. These last had nothing to do with New York, but speculators in Wall Street adopted a precautionary attitude, and prices gave way to some extent. The fall was nothing to speak of, and was easily wiped out. Hydro-Electrics rallied to 84, after going back to 82. International Holdings, which have been out of favour for several weeks, fell to 11¼. A drop of 3 took Brazilian Tractions to 67; the price then went straight ahead to 71, showing a gain of 2 on the week. The preference shares are about 220. Sofina shares, in which the activity on the part of recent buyers had lifted the price to 4¼, are down to 3¾. Montreal Light and Power withstood the depressed disposition, and gained 3¼, at 158¼, but Shawinigan

Water reacted to 104, and Power Corporation of Canada to 126. Of the Mexican issues, the Tramways Company shares dropped back to 56, this being 3 down. Mexican Light and Power, at 117½, have gone back to 6. Puebla Trams, are nominally about 17½. A rise of 10 points raised American Telegraph and Telephone to 310, while Internationals, at 140, are unchanged on the week, after being up to 143. Atlas Light and Power drooped to 27s. 9d.

### Home Rails and Trams.

The Home Railway market has made further progress down the path of reaction. Steam stocks have suffered considerably. Underground incomes show a point fall at 109, and Metropolitan consolidated is similarly lower at 59½. The latter stock deserves consideration from the speculative investor, in that the dividend of 3½ per cent. paid for last year is likely to be increased in the current twelve months. Districts, at 72, show a decline of 10s. The stock pays all but 7 per cent. at this price, on the basis of the last paid dividend of 5 per cent. The Tramway issues are dull. London and Suburban ordinary have been changing hands at a florin each. The company's 4½ per cent. debenture stock is quoted lower at 67½ middle, but was sold at 64½ this week. Yorkshire Electric Trams have been done at 3s. 4½d. and 3s. 6d. British Electric Traction deferred ordinary, at 1,625, is 25 lower. In the foreign division, Anglo-Argentine Tramways first preference fell back 2s. 6d., and are 3 5/16. The 5 per cent. debenture stock strengthened to 75. British Columbia Electric 5 per cent. preference, at 88½, is down 2. Any fall in a particular stock is attributed, these days, to sales on behalf of people who have been obliged to raise money for payment in other directions.

### Electricity Supply Dulness.

Heaviness has overtaken the market for electricity supply shares. Without a lot of business to cause the falls, share prices manifest a tired appearance. This is contrary to the traditional tendency of the market in the weeks immediately preceding a return to Greenwich time, but present conditions are slightly abnormal. Bournemouth and Poole are 2s. 6d. lower at 66s. 3d., and Scottish Power, at 31s. 6d., are down 6d. North Metropolitans, at 57s. 3d., have lost 3d., but as they gained 5s. 6d. in the previous fortnight, the reaction is hardly worth calling such. Isle of Thanet ordinary, at 37s., and the preference, at 25s., are each 3s. lower. Egham and Staines have gone back 1s. 6d. to 37s. 6d. Northamptons nearly reached 2½ before reverting to 48s. Metropolitans gave way from 48s. 9d. to 46s. 3d. Clyde Valley new shares found supporters, and the price strengthened to 35s. 6d. Richmond (Surrey) ordinary remain at 44s. Newcastle and District ordinary are 29s. 3d., the new being 1s. less. British Power and Light have eased to 16s. 6d.

### Home Railway Investments.

In the heaviness which has overtaken investment stocks, several of the Home Railway prior charge issues have come down to some extent, and there is on offer at present £500 Metropolitan Railway 5 per cent. preference stock, which can be bought at 57, and yields £5 15s. 6d. per cent. on the money. Interest payments are due in February and August. Metropolitan District debenture stocks, both the fours and sixes, are available at prices yielding £5 5s. and £5 7s. per cent. on the money, and in each case there is a moderate amount of stock on offer. These last-named are not trustee stocks, but the Metropolitan preferencee is eligible for trust investments. The debenture stocks in this particular list are scarce; £2,000 Central London 4 per cent. debenture, at 77½, which can be bought at the present time, will pay £5 3s. per cent., interest being due in January and July.

### Equipment Shares Higher.

The demand for shares in the electrical manufacturing companies is still very considerable. A number of rises have occurred in the best-class companies' shares. For example, British Insulated ordinary have risen to 4, and Callenders to the same price. Enfield Cable shares are particularly good, strengthening to 5½, at which price there are buyers. Henleys rose to 6 11/16. On the other hand, General Electrics and Associated Electrical Industries ordinary remain heavy, there being falls in both cases. English Electric shares also are weak, the preference falling 9d. to 8s. 9d., and the ordinary being a few pence down at 8s. 3d. Crompton Parkinson ordinary held their rise at 26s. 6d., the 8 per cent. preference being quoted at 25s. There is still an insatiable demand for shares in the manufacturing group, although some people in the market venture the opinion that prices have now reached levels that discount, to some extent, the dividends and rights which are likely to become available for some time to come.

### Miscellaneous Matters.

Iron and steel shares are weak; Vickers went back to 8s. 4½d. before obtaining any support. Babcock & Wilcox are unchanged at 65s. The radio-gramophone group has been very erratic. Rubber shares, having fallen asleep, took no particular part in the proceedings caused by the Hatry trouble. Business is quiet in most of the Stock Exchange markets, and the violence of price fluctuations was out of all proportion to the actual volume of bargains done.

## Share List of Electrical Companies.

#### Home Electricity Companies.

| | Nom. | Approx. Dividend. 1927. | 1928. | Price Sept. 24 1929. | Rise or fall | Yield p.c. |
|---|---|---|---|---|---|---|
| | £ | | | | | |
| Bournemouth and Poole | 1 | 15 | 15 | 66/3 | —⅛ | 4 10 8 |
| Brompton Ordinary | 1 | 8½ | 8½ | 26/- | — | 5 7 8 |
| Charing Cross Ordinary | 1 | 8½ | 8½ | 26/6 | — | 5 5 8 |
| do. do. 4½% Pref. | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Chelsea | 1 | 8¾ | 8¾ | 25/-xd | — | 5 12 0 |
| City of London | 1 | 10 | 10 | 32/-xd | — | 4 7 6 |
| do. do. 6% Pref. | 1 | 6 | 6 | 23/-xd | — | 5 4 4 |
| Clyde Valley | 1 | 8 | 8 | 36/3xd | — | ... ... |
| County of London | 1 | 7 | 10 | 57/6xd | — | 3 9 9 |
| do. do. 6% Pref. | 1 | 6 | 6 | 23/- | — | 5 4 4 |
| Edmundson's 7% Pref. | 1 | 7 | 7 | 24/- | — | 5 16 8 |
| Elec. Supply Corporation | 1 | 11 | 11 | 58/3 | — | 4 2 8 |
| Kensington Ordinary | 1 | 8 | 8 | 26/- | — | 5 7 8 |
| Lancs. Light and Power | 1 | 7½ | 7½ | 28/6 | — | 5 5 2 |
| London Electric | 1 | 8½ | 9 | 27/6 | — | 5 1 10 |
| Metropolitan | 1 | 9 | 9 | 46/3 | —⅛ | 3 17 3 |
| do. 4½% Pref. | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Midland Counties | 1 | 6½ | 6½ | 24/6 | — | 3 15 4 |
| Mid. Elec. Power | 1 | 15 | 8 | 28/3 | — | 4 8 2 |
| Newcastle-on-Tyne Ordinary | 1 | 6 | 6 | 27/- | — | 4 9 6 |
| do. 7% Pref. | 1 | 7 | 7 | 26/- | — | 5 7 8 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 11 | — | 5 9 1 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 23/- | — | 5 4 4 |
| St. James' and Pall Mall | 1 | 8 | 8 | 26/6 | — | 5 5 8 |
| Scottish Power | 1 | 8 | 8 | 31/6 | —6d. | 5 1 7 |
| South London | 1 | 8½ | 8½ | 26/6xd | — | 5 5 8 |
| Urban Ordinary | 1 | 7 | 7 | 38/3 | — | 3 13 6 |
| Westminster Ordinary | 1 | 8½ | 8½ | 25/6 | — | 5 9 10 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 25/- | — | 6 0 0 |
| Yorkshire Elec. | 1 | 8 | 8 | 36/6 | — | 4 7 8 |

#### Home Rails.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented | Stock | 4 | 4 | 71 | — | 5 12 8 |
| Metropolitan | ,, | 8 | 8½ | 59½ | —1 | 5 17 9 |
| do. District | ,, | 4 | 5 | 72 | —½ | 6 19 0 |
| Underground Electric | £1 | 5 | 7 | 23/- | — | 6 1 |
| do. do. Income | Bonds | 6 | 6 | 109 | —1 | 5 10 1 |

#### Telegraphs and Telephones.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 103 | — | 5 16 6 |
| do. Def. | ,, | 1½ | 1½ | 24½ | — | 6 4 5 |
| Automatic Telephone | 1 | 10 | 12½ | 38/9 | — | 6 8 10 |
| Cables & Wireless 5½ Pref. | Stock | — | — | 94½ | —1 | 5 15 2 |
| do. A 7½ Ord. | ,, | — | — | 84½ | — | ... ... |
| do. B Ord. | ,, | — | — | 62½ | —7½ | ... ... |
| Globe Tel. and T. Ord. | 10 | 10 | 10 | 25½ | — | *3 18 6 |
| do. do. Pref. | 10 | 6 | 6 | 11 | — | 5 9 1 |
| Great Northern Tel. | 10 | 20 | 17½ | 31 | — | 5 13 0 |
| Indo-European | 25 | 10 | 10 | 47½ | — | *5 5 3 |
| Marconi-Marine | 1 | 12½ | 15 | 2⅞ | —⅛ | 5 4 2 |
| Oriental Telephone Ord | 1 | 12 | 12 | 3 | — | ... — |

#### Home and Foreign Trams, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. | 5 | 6½ | 6½ | 8 7/16 | —⅛ | 8 4 10 |
| do. do. 2nd Pref. | 5 | 6 | 6 | 8⅜ | — | 8 17 10 |
| do. do. 5% Deb. | Stock | 5 | 5 | 75 | +½ | 6 13 4 |
| British Electric Traction Def. Ord. | ,, | 5 | 5 | 1625 | —25 | ... ... |
| do. do. Pref. Ord. | ,, | 8 | 8 | 128 | — | 6 5 0 |
| Brazil Traction | 100 | 7 | 8 | 72 | +2 | 2 15 7 |
| Brit. Columbia Elec. Rly. Pcc. | Stock | 5 | 5 | 88½ | —2 | 5 13 0 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 10/- | — | ... ... |
| London United Tram Deb. | Stock | 4 | 4 | 51½ | — | 7 15 4 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 75½ | — | 6 12 5 |
| Mexican Light Common | 100 | Nil | Nil | 117½ | —6 | ... ... |
| do. 7% Pref. | 100 | 7 | 7 | 84½ | — | 8 5 8 |
| do. 1st Bonds | — | 5 | 5 | 98 | — | 6 12 5 |
| Yorkshire (West Riding) | 1 | Nil | Nil | 5/- | — | ... ... |

#### Manufacturing Companies.

| | | | | | | |
|---|---|---|---|---|---|---|
| Assoc. Elec. Ord. | 1 | 6 | — | 2⅜ | —⅛ | 3 13 4 |
| Babcock & Wilcox | 1 | 13 | 15 | 65/- | — | *4 12 4 |
| British Aluminium Ord. | 1 | 10 | 10 | 51/3 | — | *3 18 0 |
| British Elec. Transformer Pref. | 1 | 7 | 7 | 18/- | — | ... ... |
| British Insulated Ord. | 1 | 15 | 15 | 4 | +1/16 | 3 15 0 |
| Brush Ord. | Stock | 10 | 10 | 130 | —1/- | 7 13 10 |
| Callenders | 1 | 15 | 15 | 4 | +1/16 | 3 15 0 |
| do. 6½% Pref. | 1 | 6½ | 6½ | 1½ | — | 5 4 0 |
| Crompton Parkinson Ord. | 5/- | | — | 26/6 | — | ... ... |
| do. 8% Pref. | 1 | 8 | — | 25/- | — | 6 2 5 |
| Edison-Swan 1st Pref. | 1 | 7½ | 7½ | 24/6 | — | 7 1 1 |
| do. 5% Deb. | Stock | 5 | 5 | 84½ | — | 5 18 4 |
| Electric Construction | 1 | 7½ | 5½ | 15/- | — | 7 6 8 |
| Enfield Cable Ord. | 1 | 20 | 20 | 5 | +⅛ | 3 18 0 |
| English Electric | 1 | Nil | Nil | 8/3 | —6d. | ... ... |
| do. do. Pref. | 1 | 8 | Nil | 8/9 | —9d. | ... ... |
| Gen. Elec. Pref. | 1 | 6½ | 6½ | 24/- | — | 5 8 4 |
| do. Ord. | 1 | 10 | 10 | 2 1/16 | —1/16 | 3 11 1 |
| Henley | 1 | 25 | 30 | 6 1/16 | +1/16 | 4 9 8 |
| do. 4½% Pref. | 5 | 4½ | 4½ | 4½ | — | 5 6 0 |
| India-Rubber | 1 | Nil | Nil | 12/6 | — | ... ... |
| Johnson & Phillips | 1 | 10 | — | 2 | — | 5 0 0 |
| Siemens Ord. | 1 | 7½ | 7½ | 28/9 | — | 5 4 4 |
| Telegraph Construction | 12 | 10 | 10 | 23 | — | 5 4 2 |

* Dividends paid free of Income Tax.

# Canadian Overseas Electrical Trade.

## Statistics for 1927-28 and 1928-29 Compared.

THE following figures, showing the imports into and exports from Canada of electrical and similar materials during the year ended March 31st, 1929, are taken from the recently-issued trade statistics. Figures for the year 1927-28 are given for purposes of comparison, and notes of any increases or decreases have been added :—

### Imports.

| | 1927-28. Thous. $ | 1928-29. Thous. $ | Inc. or dec. Thous. $ |
|---|---|---|---|
| *Copper wire, plain, tinned, or plated—* | | | |
| Total | 117 | 213 | + 96 |
| From United Kingdom | 2 | 13 | + 11 |
| ,, United States | 115 | 200 | + 85 |
| *Copper wire, covered, including cable—* | | | |
| Total | 497 | 757 | + 260 |
| From United Kingdom | 12 | 77 | + 65 |
| ,, United States | 481 | 676 | + 195 |
| *Electric batteries, primary—* | | | |
| Total (mainly from United States) | 154 | 90 | − 64 |
| *Electric batteries, storage—* | | | |
| Total | 527 | 632 | + 105 |
| From United Kingdom | 236 | 319 | + 83 |
| ,, United States | 290 | 312 | + 22 |
| *Electric fans—* | | | |
| Total (mainly from United States) | 117 | 138 | + 21 |
| *Electric fuses, fuse plugs, and cut-outs—* | | | |
| Total (mainly from United States) | 221 | 294 | + 73 |
| *Lightning arrestors, choke coils, &c.—* | | | |
| Total (mainly from United States) | 58 | 80 | + 22 |
| *Rheostats, controllers, &c.—* | | | |
| Total | 566 | 756 | + 190 |
| From United Kingdom | 51 | 56 | + 5 |
| ,, United States | 515 | 700 | + 185 |
| *Sockets, outlets, and receptacles—* | | | |
| Total | 334 | 353 | + 19 |
| From United States | 321 | 348 | + 27 |
| *Spark plugs, magnetos, and other ignition apparatus—* | | | |
| Total | 748 | 1,109 | + 361 |
| From United States | 732 | 1,081 | + 349 |
| ,, United Kingdom | 14 | 15 | + 1 |
| *Electric cooking and heating apparatus—* | | | |
| Total | 251 | 384 | + 133 |
| From United Kingdom | 3 | 1 | − 2 |
| ,, United States | 238 | 380 | + 142 |
| *Dynamos and generators—* | | | |
| Total | 1,329 | 1,557 | + 228 |
| From United Kingdom | 390 | 294 | − 96 |
| ,, United States | 924 | 1,249 | + 325 |
| ,, Sweden | 6 | 1 | − 5 |
| *Electric lighting fixtures—* | | | |
| Total | 814 | 1,103 | + 289 |
| From United Kingdom | 15 | 23 | + 8 |
| ,, United States | 772 | 1,041 | + 269 |
| *Electric meters—* | | | |
| Total | 347 | 408 | + 61 |
| From United Kingdom | 19 | 41 | + 22 |
| ,, United States | 327 | 365 | + 38 |
| *Arc lamps—* | | | |
| Total (mainly from United States) | 49 | 29 | − 20 |
| *Incandescent lamps—* | | | |
| Total | 320 | 190 | − 130 |
| From United Kingdom | 1 | 3 | + 2 |
| ,, United States | 78 | 76 | − 2 |
| ,, Germany | 15 | 14 | − 1 |
| ,, Japan | 172 | 67 | − 105 |
| ,, Holland | 6 | — | − 6 |
| *Self-contained lighting sets—* | | | |
| Total | 54 | 93 | + 39 |
| From United Kingdom | 8 | 3 | − 5 |
| ,, United States | 46 | 90 | + 44 |
| *Electric motors—* | | | |
| Total | 2,964 | 4,306 | + 1,342 |
| From United Kingdom | 495 | 548 | + 53 |
| ,, United States | 2,308 | 3,599 | + 1,291 |
| ,, Sweden | 151 | 117 | − 34 |
| *Switches, switchboards, circuit breakers, and parts—* | | | |
| Total | 1,420 | 1,613 | + 193 |
| From United Kingdom | 86 | 64 | − 22 |
| ,, United States | 1,330 | 1,536 | + 206 |
| ,, Switzerland | 3 | 12 | + 9 |
| *Telephone instruments—* | | | |
| Total | 873 | 1,855 | + 982 |
| From United Kingdom | 60 | 216 | + 156 |
| ,, United States | 812 | 1,638 | + 826 |
| *Transformers—* | | | |
| Total | 275 | 483 | + 208 |
| From United Kingdom | 20 | 18 | − 2 |
| ,, United States | 237 | 447 | + 210 |
| *Radio valves—* | | | |
| Total | 210 | 247 | + 37 |
| From United Kingdom | 24 | 26 | + 2 |
| ,, United States | 183 | 447 | + 264 |
| *Radio apparatus, n.o.e.—* | | | |
| Total | 3,491 | 5,692 | + 2,201 |
| From United Kingdom | 104 | 90 | − 14 |
| ,, United States | 3,384 | 5,602 | + 2,218 |
| *Electrical apparatus, n.o.e.—* | | | |
| Total | 3,715 | 4,870 | + 1,155 |
| From United Kingdom | 188 | 189 | + 1 |
| ,, United States | 3,486 | 4,626 | + 1,140 |
| *Electric vacuum cleaners—* | | | |
| Total (mainly from United States) | 181 | 172 | − 9 |
| *Total electrical apparatus** | 19,044 | 26,775 | + 7,731 |
| From United Kingdom | 1,740 | 1,927 | + 187 |
| ,, United States | 16,762 | 24,411 | + 7,649 |
| *Telegraph instruments—* | | | |
| Total (mainly from United States) | 207 | 493 | + 286 |

### Exports.

| | 1927-28. Thous. $ | 1928-29. Thous. $ | Inc. or dec. Thous. $ |
|---|---|---|---|
| *Batteries, telegraph and telephone apparatus—* | | | |
| Total | 371 | 627 | + 256 |
| To United Kingdom | 16 | 23 | + 7 |
| ,, United States | 29 | 22 | − 7 |
| ,, Newfoundland | 14 | 27 | + 13 |
| ,, Australia | 7 | 12 | + 5 |
| ,, New Zealand | 111 | 259 | + 148 |
| ,, Cuba | 40 | 33 | − 7 |
| ,, Brazil | 93 | 118 | + 25 |
| *Dynamos, generators, and motors—* | | | |
| Total | 26 | 51 | + 25 |
| To United Kingdom | — | 22 | + 22 |
| ,, United States | 17 | 13 | − 4 |
| *Electric cooking and heating devices—* | | | |
| Total | 576 | 653 | + 77 |
| To United Kingdom | 28 | 21 | − 7 |
| ,, New Zealand | 302 | 295 | − 7 |
| ,, Australia | 74 | 95 | + 21 |
| *Sparking plugs, magnetos, &c.—* | | | |
| Total | 433 | 450 | + 17 |
| To United Kingdom | 179 | 152 | − 27 |
| ,, Australia | 101 | 117 | + 16 |
| ,, India | 38 | 38 | — |
| ,, Japan | 15 | 39 | + 24 |
| ,, New Zealand | 30 | 41 | + 11 |
| *Electrical apparatus, n.o.e.—* | | | |
| Total | 443 | 610 | + 167 |
| To United Kingdom | 70 | 79 | + 9 |
| ,, United States | 45 | 48 | + 3 |
| ,, Australia | 88 | 73 | − 15 |
| ,, Japan | 73 | 38 | − 35 |
| ,, Mexico | 54 | 89 | + 35 |
| ,, Newfoundland | 41 | 15 | − 26 |
| ,, New Zealand | 27 | 78 | + 51 |
| *Electric vacuum cleaners—* | | | |
| Total | 35 | 40 | + 5 |
| To United Kingdom | 25 | 26 | + 1 |
| *Total electrical apparatus** | 1,849 | 2,401 | + 552 |
| To United Kingdom | 292 | 299 | + 7 |
| ,, United States | 98 | 95 | − 3 |

* Not including vacuum cleaners.

# The 1929-30 Lighting Season.—III.

### Electric Lamp Manufacturers' Propaganda.

IN our issues of August 30th and September 6th we said something regarding the special efforts being made by electric lamp manufacturers as a whole (through E.L.M.A.) and individually to stimulate the sale of their products. We have received further information from other lamp makers which introduces one or two new ideas.

"Cosmos" lamps are being popularised by METRO-VICK SUPPLIES in a number of ways. Three attractive envelope folders (illustrated in fig. 1) have been produced for the use of retailers, and a new lamp brochure with a striking cover is also available. The folders deal, respectively, with the "simplified line," decoration lamps and automobile lamps, while the

**Fig. 1.—Three "Cosmos" Folders.**

brochure gives full details of all the types which the company manufactures. These publications will be supported by a continuance of the company's extensive advertising campaign in the technical, trade and magazine Press.

Probably the leading feature of the campaign which is being waged by PHILIPS LAMPS, LTD., is the offer to send expert window dressers to arrange displays for retailers. The company has available some very attractive material, as will be seen from the accompanying illustration of an "Argenta" lamp display (fig. 2). There is a limited number of large displays for windows of 8 ft. and over, smaller displays for 5- to 8-ft.

**Fig. 2.—A Philips Window Display.**

windows, and a special cut-out for very small windows. A counter demonstration stand is supplied in which a clear gas-filled lamp and an "Argenta" lamp are placed side-by-side for comparison purposes. A well-produced photogravure folder is being issued. This gives complete details and prices of the whole of the Philips range and is illustrated in colour. In addition to this general list there are smaller lists dealing especially with "Argenta" (opal) lamps, "Arlita" (internally-frosted) lamps, and the "Duo-Savelite" (double-filament) lamp. There are also three 15 in. by 10 in. showcards dealing with "Argenta," automobile and "Duo-Savelite" lamps, respectively. Advertisements are to appear in all the leading London and provincial newspapers, and trade and industrial organs will be used as a medium for placing Philips lamps before a more specialised public. The company is at the same time drawing attention to its lighting fittings, of which it has a good range.

# Railway Electrification in the United States.

### Several Important Schemes Projected.

THE recent appointment by the Government of a committee to consider the electrification of British main-line railways lends topicality to an article published on August 25th by the *New York Times*. This article, which we reprint below, deals with railway electrification schemes which are under way or being considered in the United States. Our contemporary said:—

The possibility of future electrification projects on railroads, which would total about $200,000,000, was seen by observers in the railroad fields last week. This would be in addition to the $135,000,000 of electrification projects now under way. It is held by proponents of electrification that the steady increase in density of traffic, together with the increased revenues resulting therefrom, has placed the railroads in a position where, in some cases, electrification becomes not only desirable, but also financially possible. The largest electrification project under way is that of the Pennsylvania, which is installing the new power on its main line from New York to Wilmington, with a view to eventual electrification to Washington. The foundations for the overhead catenary system from New York to Trenton, N.J., have been laid, and disbursements for the project are proceeding at the rate of $15,000,000 annually, the total cost to be $100,000,000. Alternating current is to be used, and electric locomotives purchased at this time by the Pennsylvania are constructed with a view to use under this system. The Reading is electrifying its lines around Philadelphia at a cost of $20,000,000. The density of the traffic on the line of the Reading and Jersey Central between New York and Philadelphia is expected to lead to an extension of the system. The cost of this extension would be about $25,000,000 for main-line purposes, and it would approach $50,000,000 if all terminal facilities were electrified. The suburban electrification is to employ alternating current. The Lackawanna is spending $15,000,000 on electrifying its suburban lines in New York. Direct current is being used, and the system is, therefore, comparable to that in use in the New York subways and on the Long Island Railroad. The New York Central uses direct current for its electrified lines in the New York district, but its long-distance electrification is expected to use alternating current. The Lehigh Valley is considering electrifying the mountainous section of its line at a cost of about $10,000,000. Three-cylinder steam locomotives are now used for moving heavy trains over this section. A factor which may delay electrification of this line is the fact that the ownership of the Lehigh Valley is in a somewhat uncertain state at present. The Pennsylvania has the controlling interest, but it has been cited by the Interstate Commerce Commission, under the Clayton Anti-Trust Act, for acquiring this interest. The future control of Lehigh Valley is, therefore, somewhat conjectural.

An electrification which has not been much discussed, but which is a possibility, is provided by the Detroit, Toledo & Ironton Railroad. Under the management of Henry Ford, twenty-five miles of this road was electrified, and it is understood that Mr. Ford contemplated electrifying for 400 miles to the Ohio River. A road of dense traffic, with ample funds available through the Ford connection, this project probably would have materialised had not Mr. Ford decided to sell the road. The new owners are the Pennroad Corporation, an organisation close to the Pennsylvania Railroad. In view of the fact that the Pennsylvania is committed to electrification in a large way, it is possible that it may carry out Mr. Ford's plan. Changing to the new power for the Detroit road would cost about $20,000,000, if it was carried to the Ohio River.

The largest electrification in prospect, and one which would surpass that of the Pennsylvania, is that of the New York Central. For some years the New York Central has contemplated electrifying its line from New York to Buffalo. This is a section of dense traffic which ultimately, it is said, will have to employ some other energy than steam. The New York Central has for this reason consulted electrical engineers, and has gone a considerable way toward preparing plans for the project. No definite date for the electrification has been set. It would cost about $150,000,000. The New Haven, one of the pioneers in

electrification, is extending the use of the power on its New York, Westchester and Boston line. Extension of its electrified main line section beyond the present point depends largely on its financial condition. Recently, the road has been showing greatly increased earnings, and this heightens the possibility that electrification may be extended. In the west, the Great Northern is electrified for about 100 miles through the Cascade Tunnel and mountain territory. A plan for its merger with the Northern Pacific to Burlington is before the Interstate Commerce Commission. Given the success of this plan, it is believed that its electrification would be extended.

It was pointed out in engineering circles last week that, while there was sometimes considerable comment made on the saving in fuel resulting from electrification, this factor was always offset in the United States by the capital costs involved in changing over. In Europe, where coal is sometimes expensive, electrification for economy in fuel costs is sometimes practical. Here, however, coal is too plentiful to make it economical for a road to change from steam to electricity solely for the sake of reducing fuel charges. The only reason, it is said, for a railroad near coal supplies here to electrify is to avoid congestion in traffic. On some Eastern lines traffic has become so dense that in a few years steam will be unable to cope with it. The roads which have electrified or are about to electrify in the East of the United States all have dense traffic.

# Municipal Tramways and Transport Association—II.

## A Report of the Twenty-eighth Annual Conference at Great Yarmouth.

### Municipalities and Transport Services.

A PAPER entitled "The Relation of Municipalities and Transport Services" was read by Bailie P. S. DOLLAN (Sub-Convener, Glasgow Corporation Tramways Committee). He expressed the opinion that municipalities had not made proper use of the great power at their command, owing to their failure to overcome parochial barriers. They had invested over £85,000,000 in the transport services, which found employment for 320,000 men and women. Municipalities altogether controlled social capital worth £500,000,000, and employed about one million persons—one in every 44 of the population, excluding dependents. Viewed from this standpoint, they were a much greater power than the railways, but were unable to take advantage of their position due to their lack of organisation. At present the municipalities provided the Association with an annual income of £3,710. If the Association had an income of £100,000, to be spent on legislation, research, co-ordination, and expert advice, it could become a dominating influence in the transport affairs of the country.

The formation of rail-'bus combines would restrict municipal transport services to their own boundaries, unless the municipal transport authorities claimed for themselves the same powers were now granted to companies under existing laws. If private 'bus companies had not been subsidised by shareholders losing their capital, or otherwise, it would have been impossible for them to compete effectively with municipal tramway services.

It was obviously impossible for municipal transport to be conducted on business lines, so long as the services were managed by committees and corporations in the same way as they were 30 and 40 years ago. The *personnel* of these committees was excessive, and they sabotaged initiative in the managers. The maximum number of members of a committee should be ten men, carefully selected because of their knowledge of transport. This committee work should be a whole-time appointment, and should involve payment in proportion to services rendered.

The Association should send some of its experts to investigate the systems of management in Berlin, Vienna, and other cities abroad, where municipal transport was conducted as a purely business concern. Municipal authorities should be prepared to undertake long-distance 'bus services, by coming to arrangements with each other in regard to garage accommodation and other facilities.

There were other directions in which national co-ordination, properly financed, would be beneficial, such as co-operative buying of material, and even manufacture of standard equipment. The experts in the service could undertake the work, but much would depend on the municipalities. If they continued to confine their interests to their own boundaries, little progress would be made. Transport really had no boundaries, and the ultimate aim must be a scheme of road transport which would cover the whole country, and be controlled as far as possible by the public authorities. The enlarged Municipal Tramways and Transport Association might become the governing body of such a service, acting jointly on behalf of the local authorities and the State in all questions affecting road transport.

Ultimately municipalities must aim at all forms of transport, including aviation, coming under the same control. The Glasgow Town Council regarded the transport department as the proper authority to manage the underground travelling facilities in the city, and the same management was equally able to supervise air travelling. The municipal aerodromes which would be erected in the next few years should, therefore, come under the control of the local transport committees. Taxi-cab services in the provinces would also come under the control of the transport committee. He advocated a complete municipal monopoly of every form of transport catering for the public.

### Discussion.

Alderman T. CANBY (Huddersfield) said that the suggestion that tramway committees should have a small membership had already been put into effect at Huddersfield, where a membership of 21 had been reduced to 11.

Mr. J. H. WHITTAKER (Todmorden) maintained that the motor-'bus could be run successfully against the tramcar, because it was a more effective transport instrument. Many of the difficulties under which municipalities suffered to-day were due not to the cumbrous nature of the machinery of local government, but to the fact that they had been given bad advice by their experts, who advocated the tramcar as the most effective transport instrument, saying that all that was necessary was to speed up the cars and lower the fares. When the author advocated large transport areas, he must not overlook the danger that an organisation could become too large. The railways were now adopting a policy of de-centralisation.

Mr. J. M. CALDER (general manager, Reading) said that many sub-committees of the executive committee of the Association were at a standstill for want of funds. It was not fair that research and investigation work should be left to individual authorities for the benefit of the whole industry, and, therefore, means should be found for providing a larger income to the Association, so that the work could be carried out at the expense of the industry.

Alderman W. R. WILLIAMS (Cardiff) said that in making comparisons with Vienna and Berlin, the fact must not be overlooked that municipal councils on the Continent generally had far wider powers than those in this country. During a recent tour through Spain he was surprised to find that even in that backward country the local authorities had far more powers than in this country. The experts suggested by the author would be full-time men and paid accordingly, and might want to manage the undertaking, instead of leaving that to the manager.

Mr. H. P. STOKES (Plymouth) spoke of a scheme for extending 'buses over a wide area around Plymouth which he put before the Corporation in 1919. This scheme was turned down, and was now being operated by a company. There had been too great a tendency to insist upon tramways, irrespective of the conditions. The modern motor-'bus was a very different vehicle from that of 1919, and was now capable of handling a large volume of traffic over a very wide area at an economic cost. If the preference of the public was for the motor-'bus, then tramway managers must provide the 'bus.

Councillor J. H. LAYBOURNE (Chester) expressed surprise that the magistrates in Glasgow should issue 'bus licences without consultation with the tramway committee, and asked what the position would be if the magistrates refused to license a 'bus which the tramway committee desired to run.

Councillor J. FRYER (Birmingham) said that an attempt had been made in Birmingham to put into force some of the principles laid down in the paper. Birmingham Corporation was running tramways outside the city, both for a company and for another municipality.

Mr. P. PRIESTLY (general manager, Liverpool) commented upon the manner in which a municipal transport committee had to send recommendations up to its council, and indicated the delays that so frequently arose. This, he said, was not a matter of the efficiency or inefficiency of the manager or his committee. The first thing to be done was to secure legislation to alter the methods by which town councils were compelled to carry on their work at the present time.

Councillor W. D. FORSYTH (Walsall) said that if the executive committee would indicate the amount of extra money required to carry out some of the suggestions in the paper, he on his part would recommend his committee to pay an increased subscription.

Alderman T. WOFFENDEN (Huddersfield), after criticising adversely some of the proposals in the paper, advocated steps being taken to give municipalities wider powers than they

had at present. After referring to the narrow defeat of the Association's Omnibus Bill in Parliament, and the fact that the railway companies had secured their Bill, he spoke of the need for reform in the methods of licensing 'buses throughout the country. Some licensing authorities were not responsible in any way to the local council.

Councillor P. M. ROBINSON (Chesterfield) said that whilst no doubt an income of £100,000 was not contemplated by the executive committee, an income of £5,000 was within practical politics. It was the practice of many municipalities to call in an outside expert to advise them on traffic problems, but frequently they obtained only the pet idea of one man. If it were possible for the Association to obtain such an income as to be able to afford the appointment of two or three experts to give their full time advising the members of the Association, the industry as a whole would benefit, and the larger subscriptions involved would be justified.

The discussion was continued on Thursday morning, September 12th.

Mr. A. R. FEARNLEY (Sheffield) suggested that the attention of the Association should for the moment be concentrated upon the modification of the present restrictions, and that this scheme should not be overloaded with others that must remain suggestions for some time. He believed the present Government would provide for an amendment of the present legislation governing transport matters, and the council of the Association would probably be prepared to take the responsibility of drafting a Bill for this purpose.

Bailie C. C. HUTCHISON (Ayr) recommended the large municipitalities to consider the provision of facilities for aviation.

Mr. R. S. PILCHER (general manager, Manchester) said there was a great deal which the corporations themselves could do. In Edinburgh he was given permission to put on new 'bus routes at his own discretion, and the same policy applied in Manchester. It was quite hopeless if delays occurred through the recommendations of the general manager having to go through sub-committees and committees and the council, because by the time a decision was finally reached their competitors were on the road, and business was lost.

Mr. E. S. RAYNER (general manager, Hull) also urged the necessity for the amendment of legislation. If all forms of transport were brought under similar control, municipalities would not need to fear competition of any sort. At present, however, legislation concerning transport was very indefinite. Some local authorities could run 'buses long distances outside their boroughs, whilst others were not allowed to run them at all.

Alderman R. WARING (St. Helens) disagreed with the suggestion in the paper that municipal management had been an absolute failure. It was a common thing for members of tramway committees to rely upon the advice of their managers, and it was the almost universal practice for corporations to accept the recommendations of their tramway committees.

Councillor TURNER (Bury) was certain that his own corporation would not demur if the subscription were doubled or trebled, so long as the work to be done was of an important character.

Mr. W. VANE MORLAND (general manager, Walsall) said the idea of the author with regard to large transport areas was already being given effect to in some parts of the country. In his own area there was close co-operation, but even with the wide powers possessed it was impossible to carry out the development that was required. It was absurd to expect research work to be carried out when the income was only £3,700; yet it was possible for the Association, if it had the funds, to carry out research which, in the saving of fuel cost alone, would quickly justify itself.

Bailie DOLLAN, replying to the discussion, said the whole object of the paper was to emphasise the necessity for abandoning the parochial view in favour of the larger and national view. He suggested that the meeting should refer it to the executive council to consider its constitutional powers, so that it might obtain wider authority and greater finance. He was anxious to see the Association develop in such a way that it could undertake research, legislation, and investigations, both at home and abroad, in a manner that could not be done by any single local authority. He would also like to see the transport of the country managed in a similar way to that in which the Post Office was managed. Some people had objected to the payment of the members of the committees to manage transport, but he contended that under modern conditions of municipal transport it would not be possible to get the best men on the management committees unless a salary were paid. Although many of the ideas in the paper had been referred to as revolutionary and socialistic, they were identical with views which had been expressed by Sir David Brooks, who was regarded as the leader of the Conservative Party in Birmingham.

The remainder of Thursday was devoted to a private discussion on "The Relationship between the Railway Companies and Local Authorities regarding Road Passenger Conveyance Services."

## Annual Dinner.

The annual dinner was held at the Town Hall, Great Yarmouth, on Wednesday evening, September 11th, the President (Mr. W. Chamberlain) being in the chair.

The PRESIDENT, proposing "The Minister of Transport," said the municipal tramway and transport undertakings of the country represented an invested capital of £85,000,000, and the safety of the passengers had been a remarkable feature of municipal transport administration. In spite of the burden imposed upon municipal transport undertakings, there was spent last year a sum of not less than £500,000 upon the maintenance of permanent way, although that permanent way was used by all other vehicles on the roads. In addition, £53,000,000 was expended by municipalities on the upkeep of roads. Therefore municipalities maintained that they paid their way as regarded their transport undertakings, and urged that other forms of road passenger transport should be placed under the burdens which they should rightly bear. It was hoped that future legislation would result in proper co-ordination of road transport.

Mr. HERBERT MORRISON (Minister of Transport), replying to the toast, mentioned that in London it was said that the tramway was dead and finished. Nevertheless, the municipal tramways in London and throughout the country had a net income for the year 1927-28 of £5,200,000, which was an increase of something like £1,000,000 over the previous year, and the net receipts on capital for 1927-28 had increased from 5.42 per cent. in the previous year to 6.47 per cent. in 1927-28. Further, the number of passengers carried was 4,140 millions, as against 3,915 millions. Moreover, the average fare had been reduced, and was lower on municipal systems than on company-owned systems. Those results had been obtained in the face of burdens on the municipal tramway undertakings that were really unjust, although there might have been some semblance of argument for them in the old horse tram days, when the horses on the front of the car wore out the centre of the track with their hoofs. He did not know whether the new Government would find opportunity to relieve the burdens which were unfair, but if he were able to do anything it would be done. At the same time he had, in his position as Minister of Transport, to be fair as between company and municipal undertakings, and also be careful that in assisting one form of locomotion he did not damage the fair interests of others. The public would be wise to recognise the fact that tramways were still an important factor in road transport. So long as municipalities regarded their transport and electricity problems from the point of view of the narrow confines of county or municipal boroughs or urban districts, they would be beaten by large-scale competitive undertakings, which were free to roam over the whole area of Great Britain, and even beyond. Therefore, municipalities, with regard to their trading concerns, must take a bigger and wider view, and recognise that this was an age of rapid movement and long-distance transport, and also of long-distance transmission of electricity. There was the possibility of joint municipal operation by co-operation between towns in long-distance traffic. He had just returned from Berlin and Vienna, where they had developed a form of municipal ownership with commercial management which was very interesting. There was a company for operating all forms of transport, but all the shares of the company were owned by the town council, resulting in a combination of public ownership with the advantage of commercial management and administration. Tradition should not be allowed to make a municipality backward in adopting something that was new. They must not adhere to one type of vehicle because that was the most suitable 25 or 30 years ago. He was glad that many of the municipal transport authorities were revolutionising their rolling stock; the London County Council had been doing that, and the tramway system was increasing in prosperity as a consequence. Some of the company tramway undertakings were likewise adapting themselves to the new conditions. There must be the highest speed consistent with safety. Neither in Government nor business was there such a thing as finality. There was always something better to be done. If a tramway manager rested on his oars and said he had done all there was to be done, then he was finished, and superannuation was the only thing left for him.

Councillor H. W. CASE proposed "The Municipal Tramways and Transport Association."

Mr. R. S. PILCHER (vice-president, and general manager, Manchester) responded, and said it was pleasing to hear from the seat of Government that evening that the grievances of municipal transport authorities were at last recognised. Parliament had always been too congested to deal with the difficult problem of transport; it was to be hoped, however, that the present Government would find time to deal with what was a very great national problem. The Association had for a long time advocated co-operation and co-ordination, and since that policy had been discussed throughout the country there had been a move in favour of it. He had visited Berlin six months ago, and had received the same impressions as those of the Minister of Transport. Not only was the transport system of Berlin managed by one committee, but also the fare system was so arranged that it was possible to transfer from the underground to the overhead system, and to the street cars, and *vice versa*, as if the whole transport system were owned by one company. Moreover, the system operated for thirty miles outside the city. There had been attempts at co-ordination in London with very great success. In the provinces, owing to the absence of Government assistance, a voluntary system was being operated in places, and many districts had co-ordinated systems in which companies and municipalities took part, and were working together and abolishing the artificial boundaries of the individual local authorities. The Association had changed its name, and many of the transport undertakings of the country had changed their tramway undertakings into transport undertakings. Some of the smaller tramway undertakings had gone out of existence, and many of the larger undertakings must be prepared in the future to scrap those parts of their undertakings which were less efficient, because the motor-'bus was making great progress.

# Engineering and Shipbuilding Exhibition.

## A Review of some of the Exhibits of Electrical Interest.

(*Concluded from page 506.*)

### Generating Plant.

Messrs. RUSTON & HORNSBY, LTD., are exhibiting a "Ruston" 200-kW marine auxiliary generating set as supplied for vessels of several prominent shipowners. The engine is a 5-cylinder unit running on the well-known "Ruston" airless-injection principle. The engine has shown itself to be a reliable power unit capable of running continuously over long periods with heavy loads when using low-grade fuel oils.

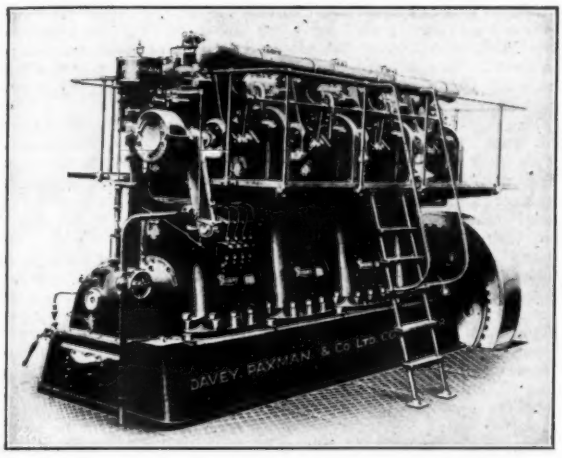


**Fig. 12.—"Davey Paxman" Oil Engine.**

Starting is effected instantly from cold by compressed air, and the engine runs steadily at all loads. The engine is of the totally-enclosed type.

Messrs. DAVEY, PAXMAN & Co., LTD., are exhibiting one of their 4-cylinder vertical cold-starting oil engines, fig. 12, designed for marine auxiliary work, capable of developing 250 h.p. continuously, with overloads of an hour's duration up to 290 h.p. The design embodies the "Blackstone" patent "spring injection" system of fuel injection, which enables the injection to take place at the same pressure and exactly the right moment whatever the speed of the engine. Also exhibited on this stand is a No. "0" size, three-section "Paxman" patent all-steel sectional boiler, which type offers many advantages over the ordinary cast-iron boiler. Being manufactured of mild-steel plates, the risk of fracture is avoided, and at the same time the life of the boiler is materially increased. It is built up on the multiple-unit system; each section is self-contained, there being no water joints to make (or leak) between them.

Included in a wide range of generating plant displayed by Messrs. PETTERS, LTD., is an "Atomic" Diesel 50-b.h.p. marine engine. This is a twin-cylinder unit provided with a reverse gear carried on an extension of the main bedplate. It operates on the two-stroke cycle, and is of the high-compression, cold-starting, airless-injection type. The fuel pump and fuel-pump operating mechanism are arranged at the forward end of the engine, the pump gear running in an oil-tight casing, and all operating controls being grouped together conveniently, including the forward and reverse controls from the reverse gear at the aft end of the engine. The governor is of the centrifugal type mounted vertically and driven from the crankshaft through the medium of helical gearing. A separate fuel pump is provided for each cylinder. The fuel pump plunger is operated through the medium of a tappet from the fuel pump cam, which is adjustable for angular position around the shaft, in order that the timing of the fuel injection can be adjusted. An automatic air-starting distributor valve is fitted and operated by a cam on the end of the crankshaft. Each cylinder is provided with a compression relief plug held in the cylinder by a milled thread "breech block" device.

Lighting sets for yachts and small country houses are displayed on the stand of Messrs. STUART TURNER, LTD. The ½-kilowatt plant driven by the "Stuart" type P.4 1-b.h.p. engine at 1,000 r.p.m. is very popular for the larger sailing yachts, auxiliary cruisers, and motor boats with an installation of 15 to 30 lights. The engine is automatically lubricated, entirely enclosed, and is cooled by means of a plunger-type circulating pump driven by enclosed gears at one-third engine speed. Particularly in sailing yachts, the freedom from vibration and quiet running of this plant are good points. Another working exhibit is the 120-watt generating set for small cottages, yachts, and motor boats. This also has a plunger circulating pump driven at a slow speed, and the plant is remarkably compact, being only 25 in. long. It is for quite a small installation of 4 to 10 lights, 12-volt motor-car lamps being used. Visitors will be able to judge for themselves how quietly it runs. An interesting item is the 1-b.h.p. air-cooled engine specially built by the company for the War Office. This is standardised throughout the Army Signal Service in England and the Dominions, and is used by the Air Ministry and aircraft manufacturers, owing to its extraordinarily light weight and constant performance. One of these engines has just been installed in an air cruiser for electric lighting and starting.

Arrangements have been made with Messrs. Matchless Motor Cycles (Colliers), Ltd., and the De Lavaud Free-Wheel Differential, Ltd., to send men from their works and to divert the production from their factories to Olympia each day to be heat treated in several electro-magnetic furnaces on the stand of Messrs. WILD-BARFIELD ELECTRIC FURNACES, LTD. This is believed to be the largest exhibition in heat treatment ever given in this country. The furnaces used in the above operations are standard works types, but the control panels are now self-contained floor units, the controls, with the exception of the magnetic indicator, being behind the panels. This development has been made to meet still further the requirements of the company's British and foreign users and to simplify the erection. The whole equipment, comprising the furnace and control gear, can be erected and set in operation by an ordinary works electrician. Fig. 13 shows two vertical furnaces, type 16.R, with an output of nearly 2¼ tons of steel parts, and type 12.E, with an output of 1¾ tons of steel parts. A new electrically-heated die-casting machine is on view on this stand. This machine is mounted on a substantial cast stand which brings it to a convenient height for the operator. The actual heating chamber is 8 in. diameter and 11½ in. deep, in which the pump mechanism, consisting of a container and cylinder machined out of cast-iron, is accommodated. The maximum loading is 2 kW, and the equipment may include either a rheostat for hand control or a regulator for automatic control. "Wild-Barfield" electrically-heated high-speed steel-hardening furnaces are being shown in operation, together with oil- and air-tempering ovens with automatic control, electric solder

**Fig. 13.—Vertical "W. B." Furnaces; 2¼ Tons and 1¾ Tons.**

bolt heaters and laboratory muffles. A Vickers "Pyramid" hardness-testing machine may be seen in operation, and samples brought by interested visitors can be tested on the stand.

### Miscellaneous.

An interesting range of electrically-driven air compressors is included in the exhibits of Messrs. LACY-HULBERT & Co., LTD. A feature is the E.L.V.O.I. two-wheeled machine shown in fig 14. It is claimed to be particularly suitable for paint spraying and operating such plant as hammers and

small drills. It has an output of 7 cu. ft. of air per min. at 100 lb./sq. in. The motor is of 1½-h.p. capacity, and the gross weight of the set is 800 lb.

Carl Zeiss (London), Ltd., are displaying some "Zeiss" marine searchlights of from 8 in. to 22 in. diameter, utilising gasfilled lamps of high or low voltage, and up to 1,500 watts consumption, and giving intensities up to more than one million candle power. These searchlights are equipped with optically worked parabolic mirrors. Models are shown for direct hand working, and also for operation from the interior of a deck house, the searchlight being mounted on the roof. "Zeiss" reflector fittings and floodlights for interior and exterior illumination of engineering and other works premises and docks, ships' interior lighting and general office lighting

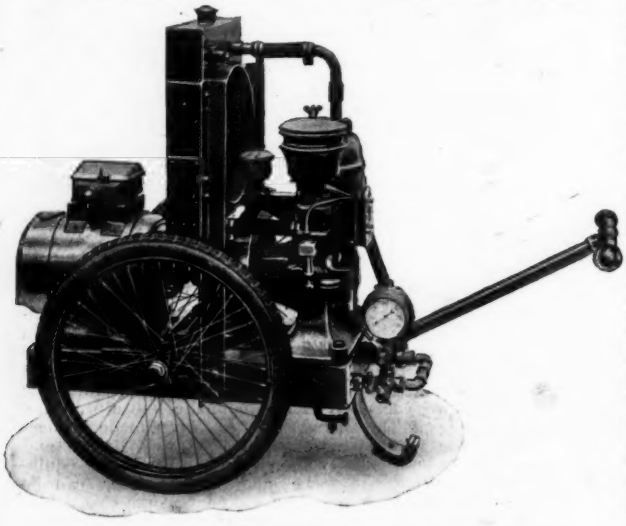

**Fig. 14.—"Lacy-Hulbert" Air Compressor; 7 cu. ft./min.; 100 lb./sq. in.**

may also be seen on this stand. The distinguishing features claimed for the whole range of lamps are high efficiency, accurate light distribution, and permanence of the reflector, which is in all cases of glass, silvered and heavily protected.

The Electro-Mechanical Brake Co., Ltd., is displaying an electric ship's winch, embodying double opposed worms, thus eliminating the necessity of using ball thrusts; a.c. and d.c. pillar-type starters, for both industrial and ship uses; a steel case crane controller, for industrial purposes; and explosion-proof air-break drum-type controller, for use in fiery mines, gas works, and on board all ships; and unbreakable jointless and rustless grid-type resistances, for use on board ship, and for general industrial purposes; and steel-case cam-type star-delta and rotor starters.

An interesting and representative selection of "B.E.V." electric industrial trucks designed for inter-works transport is included in the exhibits of Messrs. Wingrove & Rogers, Ltd. The "Super Giant Sprung" electric truck has a load capacity of two tons. It is suitable for heavy duty under severe road conditions. The "Little Giant" low-platform electric truck is of 1-ton capacity. It is intended for internal works transport where low-loading conditions are required. The "Midget Whippet" electric truck has a load capacity of 1,000 lb. It is specially designed for use in congested areas, and it can be accommodated in ordinary warehouse goods lifts. It is capable of negotiating a right-angle turn at the intersection of two 4-ft. wide alleys. Electric locomotives with capacities from five to 20 tons are also shown.

The Cable Makers' Association is displaying ten exhibits illustrating the various types of cable used for power, lighting, and telephony, with types of fittings required for connections and making branches. In addition to a range covering comparatively large armoured cable at one end to light metal-sheathed cable used for surface wiring at the other (and including under-water power cables), the show-cases display wiring systems indicating the various methods of wiring for houses, shops, and factories. Among the latter the rubber-insulated braided cables, run in special conduit tubing, are noticeable.

The most striking feature on the stand of the Stream-Line Filter Co., Ltd., is a reproduction of the interior arrangements of a filter house installation of 300 gallons capacity, similar to that supplied to the Central Electricity Board for the Central Scotland scheme. The equipment is in actual operation, substantially as used in connection with thirteen transforming stations in Scotland, where the control and filter plant is accommodated in a separately placed house. An account was given of these installations in the Electrical Review for August 16th (p. 263).

The Reliance Telephone Co., Ltd., an associated company of the General Electric Co., Ltd., has a comprehensive display of telephone apparatus on view. "Reliance" auto intercommunication telephones are shown in various finishes under working conditions. These telephones can be arranged either for full intercommunication, i.e., that every instrument can call every other, or, alternatively, partial intercommunication can be made, *i.e.*, certain instruments are barred from calling certain other stations. Secret lines, staff calls and alarm keys can be fitted to all standard models. G.E.C. automatic telephone exchanges are also shown under working conditions. They represent the latest development in automatic telephony, and are fitted with the same massive switches which are provided on public exchanges supplied to the Post Office authorities throughout the world. Standard features are absolute secrecy, there can be no listening-in or over-hearing, instantaneous connections, no operator required, compact, easy to install and simple to maintain. Special features which can be provided are fire-alarm service, conference lines, executive right-of-way, staff calls, emergency alarms, &c. Specimens of manual telephone exchanges are shown and are arranged so that they can be connected up to the land service whenever a boat is in harbour. A luminous indicator system and bell apparatus for ship work is another interesting exhibit. This is the latest type of luminous staff signalling equipment, which consists of a multiple push in each cabin to call the steward or stewardess. When operated, it will light the corresponding lamp outside the cabin and also in the steward's room and the respective corridor. The steward or stewardess releases the signal when entering the room. Various kinds of bells and indicators are also shown.

The A-S Refrigerating Machines, Ltd., another associated company of the General Electric Co., Ltd., is exhibiting a wide and extremely interesting range of refrigerating gear. The exhibits comprise various sizes of hermetically sealed leakage and explosion-proof A-S refrigerating machines. A small marine-type A-S ice maker is also demonstrated under working conditions. The A-S refrigerating machines embody many unique features which make them ideal for all purposes where small and medium-size refrigerating plant for use on ships, as well as on land in all climates, are required. These are hermetically sealed, and thus there can be no leakages or explosions. They never require recharging with refrigerant or oil for the compressors, and no expert supervision is necessary. There are no valves, glands, stuffing boxes, or gauges. The machines adjust themselves automatically to varying working conditions, and, therefore, ensures a constant maximum output. Sea water or dirty cooling water can be used. No pump is necessary. Suitable protective devices are fitted to shut down the plant in case of water failure. A No. 3 size A-S machine is shown separately, and claims for it are simplicity, safety, and sturdy design.

Messrs. Stothert & Pitt, Ltd., are showing examples of their rotary displacement pumps for land and marine service. An important feature of this exhibit is the design of pump which has been developed for such duties as forced lubrication and the handling of oils having comparatively low viscosity. This design of pump has an inner rotor with seven projections meshing with an outer rotor of eight projections, by comparison with the original pattern having an inner rotor of three projections with an outer rotor of four projections, and the seven in eight type is capable of running at higher speeds for direct coupling to an electric motor or engine without the use of gear transmission.

The exhibits on the stand of Alfa-Laval Co., Ltd., can generally be divided into two classes—the land and the marine. Taking the former first, the machine which demands chief attention is one of the type 700 portable outfits, which has been specially designed for dealing with switch and transformer oils. This particular machine is worthy of note inasmuch as it is British made, and is one of several recently ordered by certain switchgear and transformer makers for service on the "grid" scheme. The makers of British-made De Laval purifiers are Messrs. Chadburn (Ship) Telegraph Co., Bootle. This machine, which is known as type 500, is capable of dealing with switch and transformer oils at rates up to 300 gal. per hour. Other land machines comprise a type 700 (belt driven), which again is British made and has a capacity up to 700 gallons per hour, and also a type 300 (electrically driven), which can deal with oils or other liquids up to 110 gallons per hour. These stationary machines, *i.e.*, not portables, are used very largely for lubricating oil for both turbines and Diesel or other internal-combustion engines, and will, therefore, be of interest to power-station engineers or superintendents who are anxious to obtain economical working conditions.

A very interesting display of condenser tubes of all descriptions may be seen on the stand of the Yorkshire Copper Works, Ltd.

In the various branches of electrical engineering, nickel and its many ferrous and non-ferrous alloys have found extensive application. These may be grouped roughly under three main series, namely, nickel-chromium alloys, nickel-copper alloys, and nickel-iron alloys. In the first of these there are the materials of high electrical resistance and good heat-resisting properties. The nickel-copper alloys have much lower resistances to both electricity and to heat, but in this range is found an alloy having a very low-temperature coefficient. In the third group, namely, the nickel-iron alloys, there are alloys having remarkably high permeability under the influence of weak magnetising forces. These examples only indicate some of the applications of nickel alloys, further uses of which are illustrated at the Bureau of Information on Nickel of the Mond Nickel Co., Ltd.

# The National Radio Exhibition.

## Impressions of the Show and Notes on Some of the Receivers and Component Parts Displayed.

EACH year the National Radio Exhibition is described as the biggest and best yet held, and yet the number of stands and amount of space allotted to exhibitors by the Radio Manufacturers' Association continue to increase steadily season by season.

Housed as usual at Olympia in London (September 23rd to October 3rd) the show is comprehensive and practical. Notwithstanding the profusion of battery-eliminating devices available and "all-electric" domestic mains-operated sets (mostly a.c. in anticipation of the national standardisation of electricity supply) our prediction that battery-driven receivers would continue to be marketed has been fulfilled. The appearance and, what are more important, the finish and performance of manufactured receiving sets continue to improve, while the home constructor is catered for and the standard of quality of "kits" of component parts and accessories is higher than ever; it is satisfactory to be able to record the fact that components of every description are now produced satisfactorily in England. The use of screen-grid high-frequency valves and more powerful low-frequency valves enables better results to be obtained with a smaller number of valves than has been possible hitherto, to which fact is attributable the tendency to standardise 3-valve sets; it will also make it easier to provide the greater selectivity and amplification that will be demanded in future consequent upon the inauguration of the regional station broadcasting scheme. These considerations, coupled with the demand for mains operation and often adaptation for the electrical reproduction of gramophone records also, all make the designing of modern instruments more exacting and account for the price tendency being somewhat upwards, but the prospective purchaser should consider what the present-day set contains in comparison with its predecessor

The total public attendance for the seven days' duration of the 1928 exhibition reached 123,000, and with the object of attracting a greater number of visitors this season's show is to last for 10 days. The rectangular grouping of stands adopted a year ago has been retained, and many of the exhibitors' stands are again located in the identical positions in which they were situated last year. A new feature is the provision of means for the actual demonstration of broadcast reproduction within the exhibition building, an innovation that has not been permitted hitherto. A specially constructed amplifier has been installed, the output from which is cabled to 24 sound-proof demonstration rooms ranged round the gallery, in addition to which one loud-speaker may be operated (from the same source) upon the stand of each exhibitor. To prevent the difficulties which would almost certainly be encountered were the unrestricted operation of many receiving sets allowed, their use is prohibited entirely, and all loud-speakers (whether forming part of a complete self-contained receiving set or otherwise) must be operated only by the main amplifier above referred to. Thus the public will have an opportunity of comparing many types of speaker, besides which several exhibitors are demonstrating the capabilities of their individual products in temporary showrooms outside the exhibition.

The British Broadcasting Corporation's exhibit this year is located on the new main double staircase, at the head of which is the bandstand. Its main feature is a model diorama depicting the course of a typical programme from the microphone at Savoy Hill to the receiving aerial of a distant listener. There is also a model of a modern studio which indicates the main lines on which the main studio at Broadcasting House, the B.B.C.'s new London headquarters, is to be designed.

### London Electric Wire Co. & Smiths, Ltd.

The several new products to be marketed this season, of which samples are exhibited, include a "Lewcos" 3-valve assembly kit. The chassis consists of three parts, namely, for h.f., detector, and l.f. stages, the components for each being mounted and wired. The usual terminals are provided on the back edge, while in addition a number of terminals are mounted on the front edge of the chassis so that connections can be taken very easily to condensers when mounted on the panel; indeed, a complete receiver can be constructed from this chassis in little more than fifteen minutes. The coils are of the well-known binocular type, and those for both the short and long wavebands are mounted side by side on a dual six-pin base, which is operated by a control knob from the panel.

**Fig. 1.—"Lewcos" Absorption Wavetrap.**

**Fig. 2.—Marconiphone 5-Valve Receiver.**

Several novel features incorporated in the chassis permit the use of screen-grid and pentode valves of the usual type, or, alternatively, mains valves with indirectly-heated filaments.

The absorption wavetraps (fig. 1), AW.5 and AW.20, consist of an inductance coil and variable condenser designed for use in any receiver in which a standard six-pin unscreened coil, or a "Q" coil, is employed as an aerial coil. It has the following merits:—No connections to the receiver are required: one simply places the wavetrap on the top of the aerial coil and tunes out the local unwanted, or interfering, station. It is reasonably priced, and in view of the fact that many receivers, which hitherto have operated satisfactorily, will require an efficient wavetrap when the B.B.C. regional scheme is in operation, it is anticipated that there will be a demand for this component.

### Marconiphone Co., Ltd.

Displayed on a block of six stands and in a demonstration room, the apparatus shown includes a new gramophone pick-up which will prove of interest to all wireless and record enthusiasts. It possesses a substantially uniform response from 25 to 4,500 cycles and gives a large output. From a record of average cut with a medium tone needle the mean r.m.s.

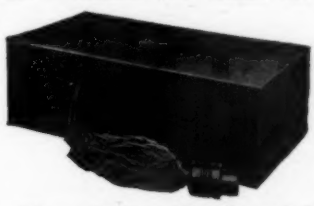

**Fig. 3.—Marconiphone Metal-cased Battery Eliminator.**

voltage is in the region of 1.5, but more important perhaps is the claim that an average record may be played no less than fifty times without showing any signs of wear.

Amongs the new receivers, Model 56 will operate from batteries or a.c. mains and incorporates three of the upright scree-grid valves, a detector, and a pentode. The set (fig. 2) is of handsome appearance, the switch knobs are of distinctive form, and edge control dials set in moulded escutcheon complete an ensemble which appeals. It is entirely screened and a new feature is the volume control on the left which provides means of varying the strength and selectivity. In the centre a 3-position switch controls the wavelength range and admits of the use of a gramophone pick-up, the socket for which is at the rear of the cabinet. Connections to the set are made by means of a patent system of interchangeable cables, which permit of attachment to batteries or mains units without

alteration to the receiver itself. Model 55 is a new moderately priced five-valve portable in an upright oak case; it incorporates a straight circuit with single tuning control and double wavelength range.

Model 47 is a new four-valve receiver in a metal cabinet, designed solely for use from a.c. mains of 200-250 volts and incorporating its own mains transformer and rectifying unit. One tuning control in the centre of the sloping panel is flanked by variable coupling and reaction controls. There is also a vernier adjustment for ensuring accurate ganging and sockets for a gramophone pick-up A special plug connector is secured to the cover, the removal of which, for the insertion of valves, &c., automatically breaks the mains circuit. The circuit comprises one screened h.f., a detector, and two l.f. stages.

For a new moving-coil loud-speaker an entirely new type of diaphragm is employed; it is pressed out from a fibrous material and very freely suspended, having no resonance within the audible range, the effects of these features being an improved balance of tone, both the upper and lower registers being heard at full value. The mahogany cabinet is of a dignified design. The popular " Octagon " loud-speaker is now available in two forms.

Amongst the battery eliminators, Model AM.7 is unusually compact. It is enclosed entirely in a metal case (fig. 3) and will energise the anodes and the filaments of a.c. valves both of the directly- and indirectly-heated types. For the anode current is available at 250 volts up to 50 milliamperes with four tappings variable in steps between 30 and 180 volts. Filament supplies at 4, 0.8, and 6 volts cover all requirements of the modern receiver of up to four or five valves; a U5 rectifier is used.

Model DC.7 is a new d.c. anode unit entirely enclosed in a metal case that will give up to 200 volts at 50 milliamperes with eight tappings variable in steps from 30 to 180 volts. The power output is normally suitable for sets with up to five valves.

### J. J. Eastick & Sons.

Three display boxes are on view. The " Eelex " range of plugs and sockets, terminals, switches, small measuring instruments, and such like accessories are amongst the most comprehensive and well made on the market, and all new lines are made to conform to those already in use. The 8-way coupling bar consists of standard T 14 plugs and sockets, and all parts are removable and interchangeable.

### Radio Instruments, Ltd.

The instrument illustrated in fig. 5 is of considerable interest and unusual construction. It is an " all-electric " screen-grid transportable receiver, being a development of the design em-

**Fig. 4.—" R.I." Testing Outfit.**

bodied in last season's 4-valve battery-less set, but with the aid of high-magnification valves the new model provides greater range, selectivity, and volume with 3 valves than was formerly possible with four. The chief feature of this receiver is that for reception over moderate distances the aerial and earth wires can be entirely dispensed with, so that the instrument may, if desired, be moved at will into any room provided with an ordinary lighting socket. This is effected by the introduction of a patented system which utilises as an aerial the flexible wire connecting leads of the loud-speaker, whilst the electric light mains provide the equivalent of an earth system. When it is desired to use an aerial, it may be of any conventional type, or can be accommodated round a picture moulding, or in any other inconspicuous position. The valves employed render only a single stage of audio frequency necessary for operating a loud-speaker of any type, the elimination of a second stage of audio-frequency amplification assisting purity and reducing the risk of distortion.

The main tuning is controlled by a single dial set at an angle of 45 deg., so that the readings are readily seen in any position; fine tuning adjustment is provided, which will be of value when the regional scheme of broadcasting is brought into operation. A double-wound output transformer is employed, thus avoiding all possibility of electric shock from the loud-speaker leads or terminals. The receiver operates on both medium and long wavebands, covering from 240 to 550 metres, and 950 to 2,000 metres. A simple change-over switch is fitted for the reception of either group of wavelengths—medium or long, there being no coils of any kind to change. In the lower

**Fig. 5.—" R.I." Transportable Set.**

compartment of the instrument a complete mains unit is fitted, suitable for alternating-current mains of 100/120 or 200/250 volts, and for all periodicities from 40 to 100 cycles. The direct-current model is suitable for operation at voltages between 200 and 250 volts. Adequate ventilation is provided for the whole of the receiver, and two standard electric light fuses are fitted in the mains unit, of an easily replaceable type, and provision for a gramophone pick-up can be made, if desired. The entire instrument has been built in accordance with the new recommendations of the Institution of Electrical Engineers, the design including the isolation of the aerial and earth terminals from the mains equipment, thereby ensuring safety against accidental short circuits and shock. The dimensions of the set are 11¼ by 8½ by 7½ in. and its weight is 19 lb.

Amongst the battery eliminators, components, and accessories shown by the company a fault-locating outfit (fig. 4) was noticed which should be of considerable utility to dealers and experimenters. Weighing 13¼ lb. and measuring 12½ by 11 by 7½ in. in height, it is mounted in a mahogany case, provided with a carrying strap, and consists of an ebonite panel on which are mounted a 3-range Weston voltmeter (10, 50 and 250 volts) having a resistance of approximately 1,000 ohms per volt, and a 3-range Weston minus 15 milliamps., 150 milliamps., and 3 amperes meter. Three special switches are fitted; also a Neon lamp with key is provided for facilitating the checking of continuity and insulation resistance of circuits. Voltage and current measurements in connection with receiving sets can readily be checked; also anode, grid, and filament circuits. An additional feature is the facilities for checking the condition of individual valves, providing for the measurement of the total emission and plate current; open circuit or short circuit in the electrodes inside the valve are, of course, also indicated and full instructions for carrying out a large variety of tests are supplied.

### Chloride Electrical Storage Co., Ltd.

A full range of " Exide " batteries and unspillable types are displayed in a wide variety of types and sizes. The cells incorporate an improved acid trap and combine a large ampere-hour capacity with the minimum of space and weight. Batteries for the suit-case type of portable receiver have their plates completely immersed in electrolyte in both the carrying and operating positions. A new anode battery, the " Exide " type WY10, has been introduced: it is of large capacity suitable for multi-valve sets, public address and sound projector systems, talking picture installations, and powerful sets taking a heavy anode current. They are made in 10-volt and 60-volt units; the plates are extra thick and robust, and non-interchangeable terminals are provided. A feature is the non-interchangeable red and blue terminals, *viz.*, octagonal positive terminals which are easily distinguished in the dark from the round negative terminals. All cells in glass containers have a moulded ebonite lid, which can very easily be kept clean, and the plate pillars are moulded as an integral part so that they cannot work loose, thus reducing acid creepage on the terminal posts. " Mass "-type cells, capacity range 20 to 100 ampere-hours, are recommended particularly for " trickle-

charge " service, or when an ordinary recharge is given less frequently than once a fortnight. They will hold their charge for extremely long periods without detriment and the cells are provided with two or three plates only of unusual thickness, embodying a thick mass of active material in a very simple framework. The " De Luxe " series of batteries in celluloid and glass, capacity range 40-80 ampere-hours, possesses the main characteristics of the " Mass "-type battery with the added ability to deliver heavy discharge currents when required.

### Fuller Accumulator Co. (1926), Ltd.

This display consists of " Sparta " accumulators in glass, celluloid, and ebonite containers for anode and filament energisation. The range includes an unspillable pattern, dry batteries, and also the " Block " type which can be used for wireless and telegraph work. The " Fuller-Balkite " trickle charger is on view also.

(*To be continued.*)

# Association of Public Lighting Engineers.

## Annual Conference and Exhibition at Bournemouth.

(*Concluded from page* 501).

THERE was a full attendance at the annual dinner of the Association, which was held at the Town Hall, the president, Mr. S. B. Langlands, being in the chair. With him sat the Mayor of Bournemouth, Alderman C. H. Cartwright; the only lady present was the Mayor's daughter. An apology for absence was received from Mr. Brydges, president of the I.M.E.A.

After the loyal toast had been honoured, Mr. JAMES MACDOUGALL, of Glasgow, proposed " The Corporation of Bournemouth." He spoke warmly in praise of the attractions of the town, and passed on to a short criticism of the lighting. He had no fault to find with the light in the gardens, but the general illumination did not strike him as being particularly safe for the motor traffic of the present day.

The MAYOR, responding, was grateful to Mr. MacDouglall for his appreciation of the charms of the borough. The system of lighting in Bournemouth might not meet with the approval of a body of experts, but it was expected that the conference would be something of an education to the town.

" The Association of Public Lighting Engineers " was proposed by Councillor J. C. MCKECHNIE, of Edinburgh. He mentioned that if he went back and told the City of Edinburgh that it would need another £2,000 per annum before it would be decently lighted, his chances of getting to another conference at somebody else's expense would not be very rosy.

Alluding to American practice in public lighting, he said he thought it was dangerous to go from bright patches of light into darkness beyond them.

While the Government was dealing with the question of the maintenance of first-class roads it might also make a grant for the lighting of those roads.

In Edinburgh they had had considerable experience of traffic signals, and were satisfied with the results. Instead of two policemen controlling traffic over a section, one would do where such signals were used.

The PRESIDENT, in reply, spoke of the growth of the Association. It had been mentioned that one day the lighting of big cities might be done from one or two large stations, and that that would displace labour. They should remember that as they put their work on a higher plane the more skilled would be the workmen. He agreed that the world was moving towards the time when all things would be done for people, not by the splitting of the atom, but by the care and attention given to the finer automatic and mechanical work.

Mr. C. C. PATERSON, president of the International Commission on Illumination, proposed " The Visitors," and in the course of a happy speech spoke of B.E.S.A. specifications and the excellent standing of disinguished guests in the same breath.

Lt.-Colonel K. EDGCUMBE, president of the Institution of Electrical Engineers, replied. He expressed his appreciation of the work the Association had done, and of the quality of the papers that had been read at the conference. The exhibition was one of the best collections of switch lighting gear that was ever got together. He looked upon the Association as an Elysian field where the lion and the lamb—the electricity and the gas industries—could lie down together, but was not prepared to say which was the lion and which was the lamb. In the United States there was more electrical energy used in lighting than for the whole of the traction throughout America. Again, the other day, Mr. Robertson, of Liverpool, said he had three hundred people employed in his department, and that he had to look after three million lamps.

He believed it had been shown that the number of street accidents in any month was proportionate to the hours of darkness in that month, showing that it is largely a question of illumination. Bad lighting was possibly almost worse, from the point of view of street accidents, than no lighting. It certainly was so from the point of view of the motorist. One of the most dangerous areas to motorists was the outskirts of big towns.

Mr. H. E. COPP, vice-president of the Institution of Gas Engineers, who also responded to the toast, thought the competition between gas and electricity for public lighting was very healthy. He hoped it would continue, for it was only by competition that they got to better methods. In certain positions electricity was to be preferred. He himself frequently recommended it, not only for certain public lighting, but also for certain private lighting. He thought both would have a place in the future lighting of this country.

In a reference to the Lighting Standards Committee, he expressed the opinion that the efforts to standardise everything were an entire mistake. What was wanted was to get the best, and they would only evolve the best by healthy competition.

# Correspondence.

***Correspondents should forward their communications as early as possible.*** *No letter can be published unless we have the writer's name and address in our possession.*

### Engineering Education.

The article on " Current Engineering Education " in your issue of September 6th was most interesting, and it is fully time that this matter was dealt with in the broad-minded manner outlined by your correspondent. Too many students are inclined to go " all out " for a degree these days, irrespective of whether they truly understand the subjects in which they qualify.

Your correspondent says " It is a remarkable fact that many of our leading engineers possess no other distinction than membership of the engineering institutions. The senior institution, the Institution of Civil Engineers, has, I believe, held examinations for Associate membership for over thirty years. The other institutions now hold similar examinations for admission. I would like to ask the opinion of your correspondent or your readers of the relative value of membership of these institutions, obtained under present-day conditions of examination, and a university degree. I am told that membership of the " Civils " by examination is considered by some engineers to be of more value than a degree.

**Young Engineer.**

*September 21st*, 1929.

### My Electric House.

With further reference to the " all-electric house," I should like first of all, in fairness to Mr. Rawll, to pay all honour due to him; he not only practises what he preaches, but he has truthfully launched out in the "all-electric home," which brings me to the point of having missed something in Mr. Rawll's first article. It is a very important point, and I am extremely sorry I failed to grasp it at first; that is, a second-class household. In a way I did try to avoid class distinction, but now that second-class has been mentioned, it gives one a better opportunity to view two different ratings, which, with your kind permission, may be termed the second and third class. Everyone will readily agree with Mr. Rawll, I am sure, that habits of householders play a most important part, particularly when dealing with economics. Also, everyone will agree *re* the advantages gained by the all-electric house, and I do not think anyone would kick at the price paid for electrical energy; but this is where it sticks: how many people in this country can afford to pay £20 to £27 per year for current? Only the highly-paid people or those with some means can afford to have the all-electric home. £27 per year for lighting, heating, cooking, &c., may not appear to mean a lot of money, yet in certain households it spells so enormous a sum that it cannot be afforded. It is the heavy consumption bills that make thousands of houses so dreary to-day, and the work harder to get through. No matter which way you look at it, it is a matter of costs, and, as I pointed out in my previous letter, cost is the governing factor. At this juncture I find it necessary to ask Mr. Rawll what, in his opinion, would be the answer to the question put to the electrical gentlemen who were present at the meeting referred to: why is it they have not all-elcetric homes? I feel certain that it would not be due to lack of enthusiasm. Of that I am confident.

In again looking over Mr. Rawll's electrical equipment, Table No. I, one must admit that it is a fine installation, and must cost quite a lot of money. May I very respectfully suggest that Mr. Rawll is living in a little world of his own, namely, second-class rating? How much thought has Mr. Rawll given to the poorer classes, who require greater assist-

ance to be able to enjoy these things? The second class certainly does offer a very large field of business, but no larger than, shall we say, the third-rate field, if sufficient inducement is offered. There is only one way whereby all classes may enjoy an all-electric home, and that is by a very large reduction in consumption cost. The next step is the system that helped to make America what she is to-day, *i.e.*, the hire-purchase system of electrical apparatus. I contend, as I believe Mr. Rawll does, that a body of influential electrical gentlemen should get together immediately and thrash this matter out. It can be done, and will mean the salvation of this country.

As a humorous phrase, may I say that the cost of the electric "currants" in that pudding mentioned by Mr. Rawll is just a little too high at present?

Below I give, for comparative purposes only, some particulars of costs that I have gathered, depicting yearly figures, which I find to be about the general run of things:—

No. 1.—Four in Family.

| | |
|---|---|
| Cost of coal per year (average) ... ... ... | £10 8 0 |
| Cost of electric lighting ... ... ... ... | 4 0 0 |
| | £14 8 0 |

No. 2.—Three in Family.

| | |
|---|---|
| Cost of coal per year ... ... ... ... ... | £10 0 0 |
| Cost of electric lighting ... ... ... ... | 4 0 0 |
| Cost of electric iron ... ... ... ... ... | 1 0 0 |
| | £15 0 0 |

No. 3.—Five in Family.

| | |
|---|---|
| Cost of coal per year ... ... ... ... | £9 0 0 |
| Cost of gas lighting ... ... ... ... ... | 1 8 0 |
| Cost of gas cooking ... ... ... ... ... | 2 12 0 |
| | £13 0 0 |

No. 4.—Six in Family.

| | |
|---|---|
| Cost of coal per year ... ... ... ... | £13 0 0 |
| Cost of electric lighting ... ... ... ... | 3 7 6 |
| Cost of small 1,000-W radiator cooker ... ... | 0 16 0 |
| | £17 3 6 |

No. 5.—Seven in Family.

| | |
|---|---|
| Cost of coal per year ... ... ... ... | £10 8 0 |
| Cost of electric lighting ... ... ... ... | 2 0 0 |
| Cost of electric fire, 1,000 W, boiling water at odd times ... ... ... ... ... ... | 0 10 0 |
| Cost of small "Primus" oil stove ... ... | 0 3 6 |
| | £13 1 6 |

No. 6.—Three in Family.

| | |
|---|---|
| Cost of coal per year ... ... ... ... | £10 0 0 |
| Cost of gas for lighting and cooking purposes ... | 6 0 0 |
| | £16 0 0 |

If we wish to strike an average of the above costs, it will be found to be something like £14 15s. per year, and it is to approximately this level that the cost of electricity has got to be reduced before it can be used on anything like the huge scale we would like it to be, in homes where economy is the keynote.

**N. Williams.**

Neath Abbey, *September 18th*, 1929.

## Domestic Wireless.

I should like to point out that the remarks of your correspondent, Mr. Mortimer Codd, regarding battery eliminators are extremely misleading. In the first place, one fails to see how an a.c. supply is "detrimental to our eyesight and general convenience." He says an eliminator means another switching operation, but this is not so for an entirely mains-operated set, and in any case is surely not a very terrible process. A good eliminator costs about £6 to £8, while a similar quality receiver is not obtainable under about half as much again.

If at all approaching correct design, an eliminator gives no hum, and, moreover, does not emulate old soldiers as do batteries. An a.c. eliminator is in most cases unable to burn out the set, as its maximum output is usually less than the working filament current, owing to decoupling resistances, &c.

Mains failure is not very prevalent, and in a general strike volunteers usually keep a supply available.

No doubt primary cells are invaluable for remote country districts and the colonies, but no one suggests battery eliminators where no supply is available.

**F. Boysen.**

Watford, *September 21st*, 1929.

## Thermal-Storage Water Heaters.

I have read with great interest Mr. L. G. A. Sims's article in your issue of September 13th, and agree with him that thermal storage can be made a commercial success and that the water-heating load is one which should be encouraged, as some supply authorities already do, by special tariffs for energy used during off-peak periods.

To me, the consumption figures for water-heating in Zurich are surprisingly low, and, what is more surprising, is how rapidly the average consumption per day per person decreases as the number of persons in the family increases. One would think that this figure would remain practically constant and independent of the number of persons, as each person in a family usually bathes and washes the same number of times, and the only apparent saving which could be made would be in the kitchen. An explanation for this figure being so low in the case of larger families may be that in most of the houses from which the records were taken, the capacity of the heaters was 22 gallons, and the larger families' heaters were not large enough to meet their requirements, so that they had to limit themselves to the supply available.

It is not stated to what temperature the water was heated, but I suppose the usual practice is to heat the water to 195 deg. F. From the figures given in Table I, page 431, the quantities of water used per family per day and per person per day can be calculated, and the following table shows these quantities for a tank temperature of 195 deg. F. and a bath-water temperature of 105 deg. F.

TABLE I.—Quantity of Water Abroad.

| Persons per family. | Consumption per person per day average kWh. | Consumption per family per day average kWh. | Consumption of water per day, gallons. Per person. 195° F. | Per person. 105° F. | Per family. 195° F. | Per family. 105° F. |
|---|---|---|---|---|---|---|
| 2 | 2.07 | 4.14 | 4 | 10 | 8 | 20 |
| 3 | 1.59 | 4.77 | 3.1 | 7.8 | 9.3 | 23.4 |
| 4 | 1.22 | 4.88 | 2.4 | 6 | 9.6 | 24 |
| 5 | 1.18 | 5.90 | 2.3 | 5.8 | 11.5 | 29 |
| 6 | 1.02 | 6.12 | 2 | 5 | 12 | 30 |
| 7-9 | 0.87 | 6.09-7.83 | 1.7 | 4.2 | 11.9-15.3 | 29.4-37.8 |

It will be seen from Table I that a family of seven persons uses less water than a family of six, and that a storage tank of 22 gallons is sufficient to meet all requirements of from two to nine persons per household if the water is heated to 195 deg. F.

I do not think these figures can be applied to this country, as from my experience the amount of water used per person per day is considerably higher. Table II gives the average consumption per day per person of four houses in Glasgow in which electric water-heated tanks are fitted. The tanks are heated for 8 hours during the night only, with the exception of the 20-gallon tank, which is of the constant heated type.

TABLE II.—Quantity of Water at Home.

| Size of tank. gallons. | Size of house, rooms and kitchen. | Number of persons in family. | Consumption per day per person. kWh. |
|---|---|---|---|
| 100 | 5 | 6 | 3.1 |
| 90 | 6 | 4 | 3.8 |
| 75 | 8 | 7 | 3.3 |
| 20 | 8 | 6 | 3.5 |

In order to find out the consumption of hot water used, my firm fitted water meters in four different houses in Glasgow, and readings were taken daily for a period of five weeks from October 31st, 1923 to December 4th, 1923. The results obtained are shown in Table III.

TABLE III.—Glasgow Figures, Coal Fires.

| Type of house. | Capacity of tank. | Adults. | Children. | Baths. | Basins. | Sinks. |
|---|---|---|---|---|---|---|
| 1. Flat, 4 rooms and kitchen | 20 | 4 | 2 | 1 | 1 | 1 |
| 2. Self-contained house, 10 rooms and kitchen ... | 70 | 8 | — | 2 | 3 | 2 |
| 3. Flat, 2 rooms and kitchen | 20 | 3 | — | 1 | 1 | 1 |
| 4. Flat, 4 rooms and kitchen | 20 | 4 | 2 | 1 | 1 | 1 |

| Type of house (contd.) | Consumption, gallons per day. Max. | Min. | Average. | Consumption, gallons per day per person. |
|---|---|---|---|---|
| 1. Flat, 4 rooms and kitchen ... ... ... | 110 | 69 | 90 | 15 |
| 2. Self-contained house, 10 rooms and kitchen | 200 | 93 | 145 | 18.2 |
| 3. Flat, 2 rooms and kitchen ... ... ... | 65 | 23 | 38.5 | 13 |
| 4. Flat, 4 rooms and kitchen ... ... ... | 88 | 22 | 40 | 7 |

These tanks were all heated by coal-fired boilers, and, as it was not convenient to obtain the temperature of the water, the figures are not much use as a basis of calculation, but they give an idea of the quantity of hot water used when the water is heated by the ordinary kitchen range.

We, in this country, are accustomed to have plenty of hot water from the coal-fired boiler, and it will retard the progress of electric water heating on the thermal-storage system if tanks of too small a capacity are installed, and consumers find that in the evening there is no hot water in the tank, and that they will have to wait until the next morning for a bath.

I think that for thermal-storage tanks with eight hours'

heating per day, at least 10 to 15 gallons per day per person should be allowed, bearing in mind that the maximum demand from the tank on special days has also to be taken into account. Heating water to 195° F. reduces the size of the storage tank, of course, but at that high temperature the losses from pipes, unless they are short and well lagged, are considerable, and every gallon drawn in excess of requirements, or wasted, costs more than a gallon at a lower temperature, and, incidentally, where there are children there is the danger of scalding.

It may be of interest to know that in a large building in Glasgow, where a thermal storage tank is installed, heated during the night, the temperature of the water was varied over set periods from 195° F. downwards, and it was found for meeting all requirements that 140° F. was the most economical temperature.

The question of what sizes of tanks should be installed for thermal storage purposes is an important one for supply authorities who are considering hiring, and, although the figures from Switzerland are interesting, I do not think they are applicable to this country. Information on this question from those who have data to publish for towns in this country would be of more value.

**Duncan W. Low,**
B.Sc., A.R.T.C., A.M.Inst.C.E.

Glasgow, *September 16th*, 1929.

## Lubricating Commutator Brushes.

With regard to the note on the above subject on page 463 of your current issue, and as a matter of general interest, may I say that lubricating carbon brushes was tried with complete success over twenty (not to be more exact) years ago, in an endeavour to allay trouble in the form of too-frequent brush renewals and commutator attention, the results of excessive sparking and the cumulative flattening of adjacent commutator bars.

The method of preparing the brushes then was to boil them in the oil and wax. Oil was tried in the first instance and the paraffin wax later, the latter giving more lasting results.

The addition of equalising connections on one armature (suggested by the motor makers), or the trial of various grades of brushes, yielded no cure, and the use of the "oily" brushes continued until they were found to be unnecessary, after the intersection mica was undercut and kept so.

The motor details and loading conditions (which latter were quite normal) are still available.

**W. Stirling.**

London, *September 17th*, 1929.

# Published Specifications.

**Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.**

### 1928.

9,289. "Mercury-vapour rectifiers." Akt. Ges. Brown, Boveri et Cie. March 28th, 1927. (287,877.)

9,354. "Battery eliminator chokes." H. Andrewes and Dubilier Condenser Co. (1925), Ltd. March 28th, 1928 (318,159.)

12,279. "Television and like systems." W. E. Beatty (Bell Telephone Laboratories, Inc.). April 26th, 1928. (318,160.)

12,543. "Electrical picture or other representation transmission or reception apparatus." O. Fulton. April 28th, 1928. (318,117.)

12,544. "Electrical apparatus for the transmission or reception of pictures or other representations." O. Fulton. April 28th, 1928. (318,118.)

12,545. "Electrical apparatus for the tranamission or reception of pictures, diagrams or other representations." L. Fulton April 28th, 1928. (318,119.)

12,546. "Electrical apparatus for the transmission or reception of pictures, diagrams or other representations." O. Fulton. April 28th, 1928. (318,120.)

12,547. "Electrical systems for the reception of pictures, diagrams or other representations." O. Fulton. April 28th, 1928. (Cognate application 37,680/28.) (318,121.)

13,332. "Wireless receiving apparatus." K. Higginson and R. I. & Varley, Ltd. May 5th, 1928. (318,306.)

14,887. "Rectifiers for alternating currents." K. Brodowski. May 21st, 1928. (Convention date not granted.) (290,985.)

15,265. "Metallic boxes for electric fuses." English Electric Co., Ltd., and A. M. Pooley. May 24th, 1928. (318,122.)

15,315. "Alternating-current-actuated arrangements for indicating or measuring purposes in an electric circuit." L. Mellersh-Jackson (Siemens and Halske Akt. Ges.). May 24th, 1928. (318,162.)

15,639. "Electron-discharge tube and connections therefor." L. Levy. May 30th, 1927 (291,354.)

15,695. "Submarine cable telegraph systems." Electrical Research Products, Inc. October 28th, 1927. (299,443.)

15,829. "Electrical fuse devices." A. H. Symondson and J. W. Walker and Sons, Ltd May 30th, 1928. (318,189.)

15,886. "Electric wave signalling systems." Standard Telephones and Cables, Ltd. (Western Electric Co., Inc.). May 31st, 1928. (Addition to 269,251.) (318,273.)

15,967. "Apparatus for rectifying alternating currents." Westinghouse Brake & Saxby Signal Co., Ltd. August 25th, 1927. (296,077.)

15,978. "Loud-speaking telephones applicable for use in connection with television apparatus and the like." J. L. Baird and Television, Ltd. May 31st, 1928. (318,278.)

15,995. "Moving-coil microp'ones." F. W. Lanchester. June 1st, 1928. (Cognate application 31,745/28.) (318,279.)

16,043. "Electric ignition devices for use with internal-combustion engines." British Thomson-Houston Co., Ltd., L. Griffiths and C. J. Morton. June 1st, 1928. (318,284.)

16,095. "Manufacture of lead or lead peroxide electrodes for accumulators." I. G. Farbenindustrie Akt. Ges. June 1st, 1927. (291,414.)

16,158. "Electric heaters." J. Stone & Co., Ltd., and S. C. Davey. June 2nd, 1928. (318,291.)

16,162. "Circuit-breakers or switches." W. B. Whitney, E. B. Wedmore and British Electrical and Allied Industries Research Association. June 2nd, 1928. (318,292.)

16,163. "Protective systems for multiphase alternating-current electric apparatus." H. Coates. June 2nd, 1928. (318,293.)

16,172. "Television apparatus and the like." J. L. Baird and Television, Ltd. June 2nd, 1928 (318,295.)

16,324. "Electric motors and dynamo machines." C. L. Daun. June 5th, 1928. (318,313.)

16,405. "Closing and opening of electrical circuits at predetermined time intervals." British Insulated Cables, Ltd., and W. C. Handley. June 6th, 1928. (318,316.)

16,576. "Circuit-controlling devices." A. F. Harmer and Drake & Gorham, Ltd. June 7th, 1928. (Addition to 304,386.) (318,317.)

16,810. "Gas or electricity controllers and the like." W. E. King and Gas Meter Co., Ltd. June 9th, 1928. (318,320.)

17,216. "Electrodes for electric furnaces." Soc. Electrometallurgique de Montricher. March 31st, 1926. (308,750.)

17,976. "Means of wireless reception." J. B. Laidlaw. June 21st, 1928. (318,328.)

17,997. "Expansion joints for pipe lines." English Electric Co., Ltd., and P. W. Seewer. June 21st, 1928. (318,329.)

18,171. "Television and telephotographic apparatus." C. E. C. Roberts. June 22nd, 1928. (318,331.)

19,002. "Electrically-heated self-circulating apparatus for evaporating, distilling, and the like." J. A. Reavell. July 6th, 1928. (318,340.)

20,297. "Spotlights for vehicles." J. Kros. July 12th, 1927. (293,804.)

21,288. "Method of and means for casting large accumulator plates." W. Haddon and J. A. Fullilove. July 23rd, 1928. (318,351.)

21,872. "Supporting arms for electrical pick-ups for gramophones and the like." A. F. J. Wright. July 27th, 1928. (318,356.)

21,927. "Dynamo-electric machines." English Electric Co., Ltd., J. E. Calverley and W Donnelly. July 28th, 1928. (318,357.)

22,330. "Manufacture of insulated electric conductors." Greenwich Cable Works, Ltd., and J. H. C. Brooking. August 1st, 1928. (318,361.)

23,027. "Electric transformers." F. Fabinger and Cesko-Moravska-Kolben-Danek Akciova Spolecnost. August 12th, 1927. (295,393.)

23,265. "Electric circuit-testing device." W. T. Henley's Telegraph Works Co., Ltd., and H. C. Hoban. August 13th, 1928. (Cognate application 11,361/29.) (318,368.)

23,585. "Portable stands for electric lamps." H. Akroyd and H. Akroyd. August 16th, 1928. (318,370.)

24,241. "Operation of electrical illumination or indication lamps by alternating current." G. H. Crook. August 23rd, 1928. (318,378.)

24,518. "Sound reproducing and recording means." R. L. Aspden. August 25th, 1928. (318,380.)

26,069. "Expansion vessels for transformers." B. Anderson and Allmanna Svenska Elektriska Aktiebolaget. September 11th, 1928. (318,397.)

29,472. "Arrangement for preventing the corona on the slot sleeves of high-voltage electrical machines." Siemens-Schuckertwerke Akt. Ges. October 13th, 1927. (298,646.)

29,694. "Manufacture and production of insulated articles for electrical engineering purposes." J. Y. Johnson (I. G. Farbenindustrie Akt. Ges.). October 15th, 1928. (318,412.)

31,404. "Electron-discharge devices." British Thomson-Houston Co., Ltd. October 20th, 1927. (299,730.)

31,683. "Electrolytic production of aluminium." Aluminium Industrie Akt. Ges. February 4th, 1928. (305,458.)

31,977. "Electric lampholders." W. V. Butterfield, A. W. Butterfield and S. Butterfield (trading as Mycromet Manufacturing Co.). November 2nd, 1928. (318,423.)

32,411. "Methods of and means for bonding together electric cable sheaths." H. Halperin and K. W. Miller. November 30th, 1927. (301,456.)

32,790. "Annealing furnaces." International General Electric Co., Inc. November 9th, 1927. (300,242.)

33,188. "Explosion pots for oil-switches." International General Electric Co., Inc. November 17th, 1927. (300,650.)

33,520. "Electrolytic production of aluminium." Vereinigte Aluminium-Werkt Akt. Ges. September 3rd, 1928. (318,431.)

34,532. "Control systems for arc welding machines." British Thomson-Houston Co., Ltd. November 23rd, 1927. (301,045.)

34,984. "Electric cables." W. S. Smith, H. J. Garnet and H. C. Channon. June 5th, 1928. (Divided application on 23,116/27.) (318,439.)

35,640. "Electric furnace." E. Bornand and H. A. Schlaepfer. December 8th, 1927. (301,912.)

### 1929.

831. "Picture and the like telegraph apparatus." Marconi's Wireless Telegraph Co., Ltd. (R. H. Ranger). January 9th, 1929. (Convention date not granted.) (303,800.)

2,188. "Long-distance communication cable." Siemens-Schuckertwerke Akt. Ges January 23rd, 1928. (304,660.)

18,235. "Photo-electric plates." J. E. Pollak (Associated Telephone and Telegraph Co.). June 1st, 1928. (Divided application on 16,105/28.) (318,299.)

18,240. "Automatic circuit-selectors for telephony." Tchoubritch, Derval et Cie. April 11th, 1927. (Divided application on 288,547.) (313,534.)

19,709. "Protective arrangements for electric power-lines or the like." R. O. Kapp and C. G. Carrothers. May 23rd, 1928. (Cognate applications 19,710/29 and 19,711/29.) (Divided application on 15,197/28.) (318,300.)

# Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 18th:—

Magret (lettering only), No. 505,007; ditto (design only), No. 505,008. Class 7. Agricultural and horticultural machinery.—The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Elfa. No. 500,525. Class 8. Electric batteries (not for medical purposes); and No. 500,526. Class 13. Electric hand torches.—Naamlooze Vennootschap Werktuigenfabriek "Rotator," 5a, Valkenburgerstraat, Amsterdam, Holland. (Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Fulcapac. No. 503,321. Class 8. Electric batteries (not for medical purposes).—Symphony Gramophone Radio (Foreign), Ltd., trading as the Fulcapac Battery Co., Chesham House, 150, Regent Street, W.1.

Reserwatt. No. 504,710. Class 8. Ignition batteries for internal combustion engines.—La Société des Magnetos R.B., 2-8, Rue Ernest Lefevre, Paris, France. (Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Lightning design only. No 504,515. Class 8. Sound amplifying apparatus, telephonic and wireless apparatus, sound detecting apparatus and sound transmitting devices for use in connection with burglar alarms.—Dictograph Products Co., 220, West Forty-second Street, New York, U.S.A. (Cruikshank and Fairweather, 65-66, Chancery Lane, W.C.2.)

Harlie. No. 505,832. Class 8. Wireless telephonic apparatus and parts thereof, &c.—Harlie Bros., 3, Balham Road, Lower Edmonton, N.9.

Agaphone. No. 504,919. Class 8. Wireless telephonic apparatus, &c.—Lionel Black, 147, Holborn, E.C.1.

Dysonus. No. 505,010. All goods in Class 8.—Hardyson Radio, Ltd., 13, Market Street, Huddersfield.

Toastmistress (lettering and design). No. 503,947. Class 18. Electric toasting stoves.—Waters-Genter Co., 213-217, North Second Street, Minneapolis, Minn., U.S.A. (White, Langner, Stevens, Parry & Rollinson, Jessel Chambers, 88-90, Chancery Lane, W.C.2.)

Idelite. No. 501,671. Class 50. A material made from synthetic resin with a mixture of paper, canvas or other material.—Bakelite, Ltd., 68, Victoria Street, S.W.1.

# New Work for Contractors.

**Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.**

*Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

AMERSHAM.—Nurses' home and ward block extensions, for Guardians; A. Saxon, Snell & Phillips, architects, 9, Bentinck Street, W.1.

ASHFORD.—Junior school, South Ashford; Kent E.C.

ASHBOURNE.—Houses (31), for the U.D.C.; E. Morley, builder, Derby.

AYLESBURY.—Additional housing scheme (60), California estate, for the T.C.; borough surveyor.

BLACKPOOL.—Bank, Church Street and Canner Street, for Midland Bank, Ltd.; J. Gorst & Son, Bisley Street.

BLYTH.—Development town hall site; borough engineer.

BOCKING.—Sewage disposal scheme with pumping station, for Braintree R.D.C.; J. D. Haworth, consulting engineer, 3, Central Buildings, Westminster, S.W. (returnable deposit of £5).

BRISTOL.—Secondary school, Cotham Lawn Road, for the borough E.C.; Dr. W. L. Freeman, director of education (returnable deposit of £2 2s.).

BURY (LANCS.).—Re-erection of works; Ashworth, Ltd., Bury Bridge (£20,000 to £30,000).

CONGLETON.—Additional 80 houses, for the T.C.; borough surveyor.

DUNDEE.—Garage, for Corporation (£40,000); city architect.

DUNFERMLINE.—Secondary school; G. Sandilands, architect and master of works, Education Offices, Kirkcaldy.

DURHAM.—Additional 100 houses, for the R.D.C.; surveyor.

ETON.—Bank, for Barclays Bank, Ltd.; Edgington & Spink, architects, 52, High Street, Windsor.

EVESHAM.—Electric lighting installation, 78 houses, Broadway, for the R.D.C.; surveyor.

EWELL.—Telephone exchange, for H.M. Office of Works, King Charles Street, London, S.W. (returnable deposit of £1 1s.).

FARNWORTH.—Housing schemes (126), Blindsill and New Bury estate; F. Ashton, surveyor to U.D.C., Town Hall.

FELTHAM.—Houses (500), Lower Feltham; Allied Building Corporation.

FIFESHIRE.—Extensions, Viewforth higher grade school, Kirkcaldy; G. Sandilands, master of works, Education Offices, Kirkcaldy.

GLASGOW.—Houses, Kings Park Avenue (32), and Carmunnock Road (186); Mactaggart & Mickel. Garage, Waterloo Street, for 400 cars; Wylie, Wright & Wylie, architects, West Regent Street. Bank, Great Western Boulevard; British Linen Bank.

HAMILTON.—Post office, Lamb Street, for H.M. Office of Works, King Charles Street, London, S.W.

HENDON.—Houses; H. J. Hook & Son (32), B. R. Ewen (31), W. Bagg (22).

HORNCHURCH (ESSEX).—Houses (46), Bush Elm Road, for Martin & Pierce; houses (30), Glebe Way, for H. G. Bown.

HUDDERSFIELD.—Housing scheme (34), Almondbury, for the T.C.; borough architect, 26, Ramsden Street.

HYTHE (KENT).—Houses (12), with electric lighting work, for the T.C.; Beach & Co., Ltd., builders, Folkestone.

IRISH FREE STATE (CORK).—Extension, Crawford Municipal Technical Institute, for the Technical Instruction Committee; D. M. O'Connor, architect.

(DUBLIN).—Wiring houses (421), in Donnycarney area, for the City Commissioners; city architect, Exchange Buildings, Lord Edward Street (returnable deposit of £1 1s.).

(CLONMEL, Co. TIPPERARY).—Hospital buildings and reconstruction of workhouse, for the Mental Hospital Committee (£30,000).

IRVINE.—Sewage disposal works; burgh surveyor.

IVER (BUCKS.).—Congregational Church, Richings Park; trustees.

LICHFIELD.—Premises, Market Street, for F. W. Woolworth & Co., Ltd., Kingsway, London.

LIVERPOOL.—Cinema, Walton Road and Furness Street (£45,000); J. A. Appleton.

LONDON (STOKE NEWINGTON, E.).—Factory, Church Street; A. J. King, Ltd.

(BERMONDSEY, S.E.).—Extensions, Alaska Factory, Grange Road; C. W. Martin & Sons, Ltd. Extensions, factory, Grange Road and Dunlop Place; Geo. Elkington & Son.

(ST. PANCRAS, W.).—Buildings, 363-5, Euston Road, 41-2, Warren Street, and 37-9, Southampton Street; Constantine & Vernon, architects.

LONG SUTTON.—Secondary school (£30,000), for Holland E.C.; director of education, Boston.

MAIDSTONE.—Extensions, county offices; Kent C.C. Special Committee. Extensions, with central heating and lighting work, West Kent General Hospital (£50,602); Corben & Son, builders.

MANCHESTER.—Stores, Barlow Moor Road and Hardy Lane, Chorlton-cum-Hardy; C.W.S., Ltd., architects' department, Balloon Street.

MONTROSE.—Alterations, Royal Asylum (£10,000); Dr. C. J. Shaw, medical superintendent.

MORECAMBE.—Church and school, Balmoral Road; First Church of Christ Scientist.

NEWQUAY.—Hospital and Nurses' Home. Higman & Taylor, architects.

NORTHFLEET.—School for Kent E.C.; E. Salter Davies, director of education, Sessions House, Maidstone.

OLDHAM.—Alterations, Palladium Picture Theatre, Union Street; Palladium Pictures, Ltd.

OLD HILL.—Houses (100), with electric lighting work, High Haden, for Councillor Willetts, chairman of Rowley Regis U.D.C.

ORPINGTON.—Central school; Kent E.C.

PAIGNTON.—Heating and lighting, School of Art; U.D.C. surveyor.

PAISLEY.—R.C. church (£30,000); Rev. G. White, St. Mirin's Rectory.

PENSNETT.—School, for Worcestershire E.C.; county architect, Worcester.

PENZANCE.—Extensions, Cliff Hotel; H. Maddern.

PLYMOUTH.—Nurses' quarters, Blackadon, for Mental Hospital Committee (£16,464); Wakeham Bros., Ltd.

PORTLAND.—Housing scheme, Weston; U.D.C. surveyor.

PRESTON.—Grammar School at Leyland, and Grammar School extensions at Hutton, for Lancashire E.C.; Stephen Wilkinson, architect (returnable deposit of £2 in each case).

RAMSGATE.—Electric lighting plant, Haine Hospital (£3,244), for the Isle of Thanet Joint Hospital Board; Mr. Monkhouse, engineer.

RAWTENSTALL.—Employment exchange buildings; local manager.

RICHMOND (SURREY).—Extensions, Royal Hospital; Brewer, Smith & Brewer, architects.

RINGWOOD.—Waterworks pumping house, &c. (£23,343), for the R.D.C.; Grounds & Newton, contractors, Bournemouth.

ST. HELENS (LANCS.).—Theatre, Pilkington Special Hospital; Pilkington Bros., Ltd.

SITTINGBOURNE.—Two central schools; Kent E.C.

SOUTHEND-ON-SEA.—Extensions, Nazareth House, with lighting and central heating (£20,000); C. W. Pavey, builder. Rebuilding premises, Westcliff, for G. Smerdon and Sons, Ltd.

STAFFORD.—Police station, for the T.C.; W. Plant, borough engineer (returnable deposit of £5 5s.).

SWANSCOMBE.—Houses (30), Council estate; U.D.C. surveyor. Alterations and additions, White Hart Hotel, Greenhithe; Style & Winch, Ltd.

SWANSEA.—Housing schemes, Mayhill estate, and at Waunarlwydd; borough architect. Elementary school, Baptist Well; borough architect. Warehouse, Northampton Place; Refuge Assurance Co., Ltd. Additions, cinema, Main Road, Mumbles; T. E. Merrels. Additions, Victoria Works, Wychtree Street; B. Hinds & Co., Ltd.

TAVISTOCK.—School (£17,000), for Devon E.C.; Mr. Morris, county architect, Exeter.

THORNABY-ON-TEES.—Aerodrome, for the Air Ministry; Wright, Anderson & Co., Ltd., contractors, Gateshead.

WESTBOURNE (SUSSEX).—Sewerage scheme, with pumping plant, Bosham (£36,000), for the R.D.C.; Mr. Bateman, consulting engineer.

WEYMOUTH.—Grammar School extensions (£12,000); Weymouth Corporation and Portland U.D.C. Shops and premises, Crescent Street and Queen Street; Clarke and Cross.

WICKHAM.—Central school, West Wickham; Kent E.C.

WORMINGFORD (COLCHESTER).—Re-erection of mill, for C. Hitchcock, Ltd.

YIEWSLEY.—Houses (200), for U.D.C.; surveyor, W. T. Morgan.